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ARCHITECTURE

ENGINEERING

DECORATION

CONSTRUCTION

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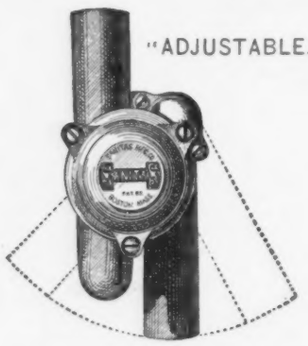
THE SANITAS TRAP.

"RIGHT HAND."



"ADJUSTABLE."

"LEFT HAND."

SOME FACTS AND SOME FANCIES
ABOUT THE SANITAS TRAP.

I. It is sometimes asserted that the seal of the Sanitas Trap can never be broken under any conditions. This is erroneous. Its seal can be pumped out by a force-pump, or by *Laboratory plumbing apparatus*, especially devised to destroy the seals of traps by siphonage. But the seal of the unvented Sanitas Trap *never can be and never has been destroyed by siphonage in good plumbing work.* Furthermore, the unvented Sanitas Trap will stand a severer test of siphoning action than will the vented S-trap. This has been demonstrated over and over again, and the demonstration can be repeated at any time to the satisfaction of any who are interested, provided care be taken to vent the S-trap in a manner *which is practical in plumbing*, using a vent-pipe of the size, length, and average number of bends found in ordinary practice. The seal of the Sanitas Trap will be *lowered* by severe siphoning action, *but it cannot be broken.* II. Again it is sometimes asserted that the Sanitas Trap cannot be clogged. This is also erroneous. The trap can be clogged by matches or kitchen refuse, if improperly used, just as can any ordinary waste-pipe; but when properly set and used the Sanitas Trap will never become clogged to the point of losing its effectiveness. If improperly used, as when under kitchen sinks the cook takes out the sink-strainer and sweeps into the trap bones and refuse never intended for the waste-pipe, the Sanitas Trap will be fouled; but it then *has the great advantage over all others of providing the easiest and safest means of removing this refuse matter*, and that with the aid of an ordinary screw-driver. When used under sinks the trap should be placed close to the sink outlet, and the sink strainer should never be removed. The grease will then pass through the trap in a liquid state and be caught in the suitable grease receptacle beyond. The efficiency of the Sanitas Trap will then remain intact indefinitely, while other traps, like the old-fashoned "D" trap, or its modern representatives, the "Bottle," "Round," and "Pot" traps, have bodies so much larger than their inlet and outlet arms, that they obviously cannot be scoured by the water when it passes through them. III. It is often thought that where special trap vent-pipes are called for, the Sanitas Trap is not needed. Precisely the opposite is the fact. All sanitarians now admit that whether the trap vent-pipe be used or not, *the trap itself should be anti-siphonic*, since the vent alone cannot always be relied upon. The mouth of the vent-pipe is often clogged, under sinks, by grease, since it is never scoured, and the friction due to its bends, and to the disproportion between its capacity and its length, often destroys its efficiency as an air supply. The Sanitas Trap is so constructed that its seal cannot be injured by evaporation produced by trap venting. Therefore, *where trap-vent pipes are called for the use of the Sanitas Trap is particularly necessary.* In virtue of the peculiar construction of the Sanitas Trap, *its outlet-pipe forms its own vent-pipe*, which is infinitely better than a special vent-pipe, inasmuch as it is always kept open by the scouring action of its own discharges. But even if it should ever become closed by grease, no harm could come in this case, since the same closure would not only shut off sewer-gas and siphonage, but also at once announce itself and be removed. IV. Finally, the seal of this trap can never be destroyed by *back-pressure*, in properly arranged plumbing. For with the main soil-pipe vented as it should be, no back-pressure can be generated strong enough to do mischief, where ordinary care and intelligence are used in originally laying out the work. For further explanations on this matter see the circulars and other publications of the

BRASS TRAP.

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A COMPETITION, the terms of which are in many respects satisfactory, while the object of it is in the highest degree commendable, is announced in New York, the Legislature of the State having passed an Act directing the Superintendent of Public Instruction to procure plans for school buildings of different sizes and cost. In carrying out this commission the Superintendent has, as we think, made a serious mistake in restricting the competition to architects residing or having offices in New York, but his statement of the requirements to be fulfilled is so thoroughly understood, and his remarks on the considerations which should influence designers show such an appreciation of the importance of good school architecture to the community, that we can easily forgive him for not knowing just the feeling of professional men on such subjects, or the difficulty of getting satisfactory results from such competitions, even without restricting the number of architects who shall be allowed to enter them; and thank him sincerely for the compliment he pays the profession in saying that a good school building exerts in itself a strong moral and educational influence, and in appealing with earnestness to architects to give their "valuable coöperation" to an undertaking of which they, more, perhaps, than any others, can appreciate the importance.

WITH Mr. Draper's opinion that the beauty, wholesomeness and convenience of a good school building exercises a great influence upon the community which uses it we fully sympathize. No one who observes young children can fail to notice how strongly they are influenced by their material surroundings. Grown people, by the help of that control over their thoughts which is the acquisition of maturity, can keep their minds pure amid filthy surroundings, and be gentle and courteous in the midst of the brutal ugliness and discomfort of a country school, but children cannot; and there is nothing more touching to a teacher than the struggles of boys and girls, who have come to the age of aspirations and ideals, against the overwhelming influence of external circumstances. A good teacher, against whose developed character such circumstances have no more power, can to some extent counteract their baneful effect on his pupils, but they ought not to be allowed to exist, and, instead of abandoning children at the most impressible period of their lives to form their minds upon models of sordid neglect, unwholesomeness and indecency, it should be the sacred duty of every community to keep the young constantly surrounded by everything that can strengthen and develop the body, and refine and elevate the thoughts. At present, the persons who can provide best for both these objects are the architects. They may not know the whole science of psychology, but they can build school-houses in which children's eyes will be insensibly strengthened, instead of being ruined for life; in which their lungs and nerves will be fortified by inhaling a pure atmosphere, instead of being corrupted by breathing "school-room air," the synonym among sanitary chemists for the foulest atmospheric mixture that human beings can inhale without immediate fatal result, and in which darkness, squalor, confusion and noise shall be replaced by light, solidity of construction, convenient and well-studied planning, and the quiet efficiency in school work which depends upon such planning. We cannot say that we think the rewards offered by the State of New York are sufficient to bring out the best possible plans, which can be produced only by an expert, after careful study of innumerable examples, but we hope that the good feeling of such New York architects as have the requisite leisure may induce them to lend their aid by sending designs which, if not absolutely perfect, will at least be far better than those on which the great majority of school-houses are built. The State asks for six plans, for buildings ranging from frame structures, to cost not more than six hundred dollars, to brick village schools, costing ten thousand dollars, and accommodating two hundred and fifty pupils, and the premiums offered are from one hundred to one hundred and fifty dollars for the best, and fifty to seventy-five dollars for the next in merit, in each class, these prizes, however, as we understand it, to be full compensation for working-drawings and specifications, which are to be furnished, if required, in addition to the sketches. The judges are experienced teachers and school-superintendents, aided by Mr. A. W. Fuller, a well-known architect of Albany, as expert adviser.

A LIVELY sensation has been caused in the profession in England by the account of a transaction which took place recently at Leeds. It seems that the School Board of that astute city bethought itself of a way of getting something at less than its value, and, being in constant need of the services of an architect, it advertised, inviting tenders from architects as to the compensation for which they would do the professional work of the Board. In most places such an advertisement would simply excite a laugh among respectable architects, but some members of the profession in Leeds seem to have either a different understanding from their brethren of what constitutes good professional service, or an abnormal notion of what such service is worth, and one firm, containing as a member a past President of the Leeds and Yorkshire Architectural Society, made a proposal, offering to do such work for a commission of three and one-half per cent on the cost of work entrusted to it. Some subsequent negotiations took place, probably managed by the financial genius of the Board, as a result of which the architects found that they had entered into an obligation to include in that modest commission the cost of taking out bills of quantities, of surveys and levels, and expenses incurred in visiting any number of existing buildings to which the Board might think fit to send them. The Board construed this last clause rather more liberally, we imagine, than the architects intended, and their first duty, after their tender had been accepted, was to obey an order of the Board to visit at their own expense buildings in nearly every county in England, besides Scotland, to gain information to aid them in designing a single school-house.

IT may be imagined that this sort of interpretation of its architect's duties on the part of the School Board reduced the prospect that its professional adviser would get much profit from his employment to a very distant one, and the other architects of the neighborhood very properly protested, both against the way in which the contract of service was made, and the injury done to the profession by the folly of the victims. Worse than this, it turned out, on investigation, that a well-known and

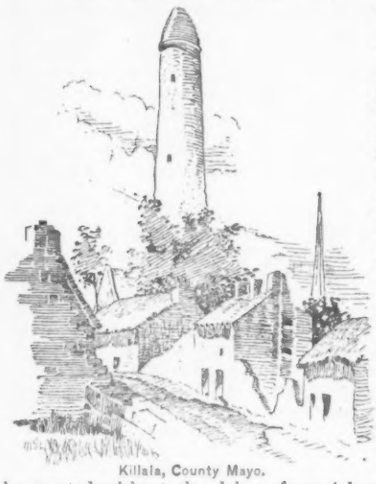
excellent architect, Mr. George Corson, one of the leaders of the profession in the North, had been approached to learn his terms for the services required by the Board, and he, understanding that Mr. Birchall of the other firm, whose standing he knew, had made a tender, replied hastily that he would do the work for the same compensation as Mr. Birchall. He did not know what Mr. Birchall had agreed to, and was very unpleasantly surprised to learn later that he had made a contract to do an immense amount of responsible work on terms which he characterized, in a communication to the Board, as "totally inadequate as a remuneration for the services required." However, the Board appears to have got him fast, as well as Mr. Birchall, and, since either of these gentlemen would submit to be ruined rather than enrich themselves, as they might, by taking the builders' twenty per cent commission to supplement the Board's three and a half, they have a doleful prospect before them. We trust that they may find some means of release in the end. Meanwhile, they must console themselves with the reflection that they have furnished a conspicuous warning to other architects who are disposed to make hasty bargains.

A PROJECT has been formed by the Paris correspondent of a Vienna paper, M. Grunèke, for securing the erection of an immense number of small houses, by means of an issue of bonds to the amount of fifty million dollars, under the auspices, but without the guarantee, of the city of Paris, which is, in return for its favorable consideration, to become the owner of the houses at the end of a term of seventy-five years. It is well known that municipal bonds in small amounts are very popular investments abroad, and where they are joined with a chance of drawing a prize in an official lottery, as is often the case, they sometimes command a very high premium, the bonds of the city of Milan, for example, which carry no interest, but give the holder a chance of a prize varying from two dollars to ten thousand, selling at sixty-five per cent premium, while those of Friburg, which are of a similar character, bring about the same premium; and M. Grunèke proposes to take advantage of this disposition of investors by issuing notes of various denominations, from one franc upward, under an agreement by which a certain number of notes is to be redeemed every year at double the face value, the amount of the notes so redeemed annually averaging one and one-third per cent of the whole issue, so that in seventy-five years the whole fifty millions will be paid off at twice the face value. In addition to this, all the bonds, though bearing no interest, carry with them chances of drawing special cash prizes, varying from fifty cents to forty thousand dollars. It is evident that this way of raising money, while very tempting to small investors in a place where loans on real-estate security bear a very small interest, is safe enough for the borrowers, who have seventy-five years in which to pay off their capital with only simple interest for twenty years at five per cent added, at the par value, and they can probably reckon with confidence that the premiums paid for the bonds would more than suffice for the lottery prizes. Of course the scheme is a charitable one, but even a charitable enterprise loses nothing by promising financial success, and the plan might perhaps be imitated with advantage on a smaller scale by building associations who wish to borrow money for their own benefit.

THE way in which associations of small capitalists can carry on building operations for their own benefit is well shown by an account given in *Le Génie Civil* of a society at Orleans. Two Orleanais workingmen, who seem to have heard of the English building societies, undertook to establish one among their friends. A company was formed, with a paid-up capital of less than fifteen thousand dollars, divided into shares of twenty dollars each. A beginning was made by buying land and preparing for the construction of houses for customers. No houses were built in advance, but persons who wished for small dwellings were provided with them at a certain price, according to the plan agreed upon between the parties, and favorable terms of payment were made. Five per cent dividends were regularly paid, and in eight years a reserve and sinking fund created, and the capital fully paid up, first to the legal extent of forty thousand dollars, and subsequently, under new authority, to eighty thousand, and during that period the society built two hundred and fifteen houses at a cost of five hundred and fifty thousand dollars, every one of which was sold before it was even begun. This method of proceeding differs materially from that of the English building societies, but it certainly has its advantages. The system of buying houses built by a company or individual seems to suit the French workingmen better than that of borrowing money to build his own house, and we are not sure that he does not save time and money in that way. One private proprietor, M. Fabien, who has built a large number of houses for poor people, testified before a municipal Commission that he found no difficulty in selling his houses at once to men who immediately occupied them with their families. He required the purchaser to pay one-half the price of the house in cash, which left him ample security for the balance, but he sold to no one without first making careful inquiry as to his character for sobriety and prudence. When, as sometimes happened, a deserving purchaser could not make the full cash payment required, he would consult with the man's employer, who would generally advance the necessary money, taking a second mortgage on the house as his security. We suppose that the roarings of the Socialists and property-confiscators have of late tended greatly to prevent in all countries the application of capital to the use of the working-people whom the apostles of theft pretend to represent, but until society is completely overturned, which will not be for a good many years yet, there could hardly be a safer investment, from the most selfish point of view, than the construction of well-planned small houses, to be sold on such terms as are the rule in Paris, while, to most men, the thought that every well-built little house sold to a prudent and honest workingman represented a family growing up in modest peace and happiness, would bring a satisfaction which successful speculations fail to secure.

A LEGAL question of interest to builders has recently been decided abroad. It appears that a certain architect, Mr. Brandreth, entered into a speculation which had for its object the erection of a circus building in a suburb of London. Brandreth had had experience in designing such buildings, but no money, and he induced two other persons, named Baker and Ginnett, to furnish funds. Several builders made estimates, based on some rather rude drawings of Brandreth's, but they proved too high, and Mr. Bickmore, the plaintiff, was called in. He met Brandreth on the ground, and was asked by him to assist in making the plans and specifications, and to estimate on them, which he did. Meanwhile, he had been introduced by the architect to Baker and Ginnett, as the principals in the enterprise. When the specifications were ready, Mr. Bickmore sent them, with his estimate, and a written contract, to Brandreth, expecting to receive from him the agreement signed. Instead of that, he received a letter, saying, "Hope to begin work on Monday, or, at least, sign your contract. You may get scaffolding on the ground when you like." The letter closed with a request that he should meet Brandreth and Baker on the ground the next day. He did so, and discussed with them the terms of payment; and on his saying that he wished for weekly payments, Baker told him that he would be prepared to make weekly payments on the certificate of his architect, Mr. Brandreth. Taking this to be equivalent to a formal contract, Mr. Bickmore went on rapidly with the building, receiving payments on account until it was nearly done, then he received a notice to stop from the architect, joined with the information that he should "require the builder to enter into a building agreement, containing the usual clause and providing sureties," before the resumption of the work. Bickmore then wrote to the architect, enclosing his account for work done up to the stoppage of proceedings. He received a reply disputing the accuracy of the account, and soon after another builder was employed to complete the structure. No notice was taken of his subsequent requests for payment, and he brought suit against Baker and Ginnett as principals. Both these denied having any interest as principals in the matter; said that they had never been introduced as such by Brandreth, and would have promptly denied the relation if they had been, and sought to throw the responsibility on Brandreth, who corroborated their testimony, and said that he was the sole proprietor and had only borrowed money of them. The judge, after the English manner, asked the jury if they thought it likely that any one would lend Brandreth money without security, or that a builder would go to work without knowing where his money was coming from, and on this hypothetical testimony from the bench, the jury at once found a verdict for the builder, with costs.

THE ROUND TOWERS OF IRELAND. — II.



Killala, County Mayo.

IN the earliest ages of building, memorial architecture has always taken a form peculiar to itself, in which height was the object to be gained, and height with a base as limited in area as was consistent with safety. Proportion between width and height was not considered of particular consequence. The several parts making together the total height were all duly proportioned the one to the other, according to the appearance desired, whether massiveness, slenderness, heaviness or lightness. Naturally, the simplest monuments would be those that could be erected without the delay of special workmanship; as, for instance, the bough of a tree set up on end, or a large, oblong rock set also on end, and propped up, perhaps, with small stones; but as character was developed and tastes were formed, with the progress of civilization, it became customary to *build* these memorials—to pile up squared stones, one upon another, and to cap them with one shaped to a more special design.

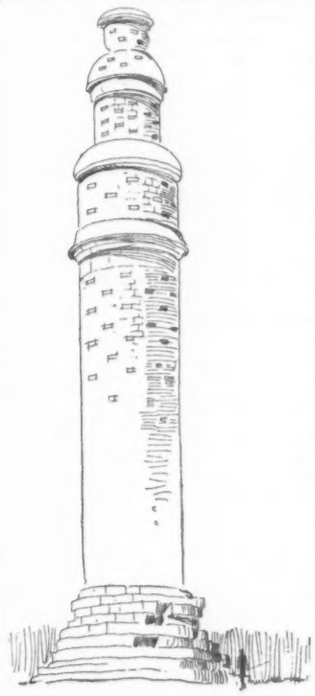
In the great building days of Egypt, when to raise huge monoliths was an every-day experience, one of these would be set on end, — perhaps roughly shaped into obelisk form; then, later, a base was suggested, and for the next monument a monolith was prepared, a base erected, and the obelisk raised on top. The dimensions of a few of the best known of these monolith obelisks of Egypt (including the bases), out of the many thousands that were erected on the east bank of the Nile, are as follows: The oldest known, standing at Heliopolis, is rather over 68 feet in height. Another, at Karnac, is 93 feet 6 inches. Several were removed from Egypt by the Romans, and no less than twelve stand in Rome itself. Of these, the magnificent one that stands in the Piazza-di-San-Giovanni, in Laterino, is 150 feet high. The two obelisks of Luxor — one of which was given to the French and now stands upon a modern base in the Place de la Concorde, in Paris — are both between 75 and 77 feet high. Cleopatra's Needle, whose later history is so well known, which, in ages past stood a giant and silent sentinel before the door of death, and now, raised on a pedestal, overlooks the noisy traffic of the Thames, in London, is, without its base, 68 feet high.

Taking the monoliths themselves apart from their bases, we find that the height is sixteen times, and often more, the diameter of the base. As they stand alone by their own weight, the full dignity of the monolith forces itself upon the imagination. A single great stone, towering aloft, all its angles worn and broken with age, its very base, its own natural widest part, having become so worn away that little flat surface has been left, it stands huge and brown in its rugged dignity, and one fancies if it had but a voice what a history it could relate. All these monuments of departed greatness were, as is well known, solid from top to bottom; the great weight of the obelisk proper necessitated tremendous solidity in its constructed base. Height was the majestic idea, and how well the ancients knew how to gain the effect they desired! Imagine an obelisk of rich granite of Syene just set up in its place, the top of the artificial base rather above the eye of the spectator as he raises his head slightly, without effort, to a point which is unconsciously fixed upon as the "point of sight," so nicely was the base proportioned with reference to the place from which it would most be looked at. From this point, without jar or hindrance, the eye naturally travels up, instead of down, along the slightly-inclined side or angle of the monolith itself until the neck is strained and the height seems much greater than it really is. The truncation of the obelisk adds to the delusion; the actual point of the apex would be lost to the near observer: then comes the projection of the brass-metal disk, which surmounted most if not all of them, to represent the sun, spreading out beyond the neck formed by the truncation, and the height of the whole would be set down about a quarter more than it actually was. Had these rigid lines been broken by however slight a projection, the sense of height would have been lost. The base constructed is nothing; it is beneath the eye line and only serves to raise the obelisk, so that no part of it escapes notice.

No attempt was made to build hollow obelisks. Lofty structures were erected all round about, but whenever there was to be a hollow space in them the base was increased to a diameter almost equal to the height of the building. While these obelisks stood alone in their character of monuments, and their form was left as specially adapted and sacred to the purpose of a memorial to the dead, other buildings were being erected throughout Egypt; palaces and temples were for the use of the living, for which entirely different forms were used. In these buildings round pillars were erected, built up piece by piece, drum piled on drum, until a great altitude was attained, and on the tops of series of these pillars rested the heavy beams of the roofs. Centuries went by; conquering armies came from the West, and returned again to their native lands, but not as they came. In their minds they had new ideas of many kinds; they had seen other lands, other people, and learned their habits, customs and life. They approved of this fashion and disapproved of that, and what they liked they carried away in their hearts, to reproduce at home. Some forms of building they appreciated; others they did not understand, and they took away with them the memory of forms congenial to them. They left the obelisks to look after themselves, but with the round pillars they went to "do likewise."

I need not here enter upon a description of the various phases of the pillar in the lands of the Greeks. I pass over the period of the dignified simplicity of the Doric column, and need no more than allude to the struggles over the Ionic scrolls and take up the line of argument again with the fully-developed Corinthian order. And what kind of column have we before us? A graceful, highly-ornate, richly-proportioned pillar, standing alone, a proof of the then known world's culture and intellectual development. It is a thing of grace and beauty, but, unhappily, in a wrong place. It is the highest type of the architecture of the day. But this pillar, standing alone as a monumental sign, although out of place without the accompaniment of entablature and pediment, fellow-columns and the walls of the temple, is an important feature. The Romans, among their trophies of war and spoils of victory, at various times brought back with them from Egypt many monolithic obelisks, but they could not appreciate the stiff, and to them unsympathetic, form, except as a sign of their conquests; they took a hint, however, and set up a Corinthian column in its graceful beauty alone, as an emblem of victory that struck in their hearts a responsive chord, and swelled their breasts with a feeling of pride. This form appealed to their imagination and roused their feelings: while the obelisk was foreign to them they felt there was life in the column. "Of the pillars of victory," says Fergusson, "one of the most celebrated is that erected by Diocletian at Alexandria. A somewhat similar one exists at Arsinoë, erected by Alexander Severus, and a third at Mylassa, in Caria. All these are mere Corinthian pillars of the usual form, and with the details of those used to support entablatures in porticos. However beautiful they may be in their proper place, they are singularly inappropriate and ungraceful when used as minarets or single columns." He mentions two others in Rome of the Doric order.

The Roman was not the only nation that used the circular pillar as a monument or memorial. Both east and west of Egypt we find the pillar in use alone, though of very different forms. In the east as in the west a pillar was taken, originally designed for use in conjunction with walls, roofs and other columns, and made to stand alone for a specific object — a pillar similar in all its details to those in front of the temples. We read of Solomon, setting up two such pillars in front of the great temple of Jerusalem, and further east in Buddhist countries we find not a few. The following description of the Allahabad pillar will, of course, serve for all in that neighborhood. To quote again from Mr. Fergusson: "It is of one stone 42 feet 7 inches in height, of which 7 feet 7 inches may be considered as base, which was probably buried to some extent in the ground, or in the masonry that supported it. The shaft, properly so called, was 3 feet in diameter at the base, diminishing to 2 feet 2 inches at the summit. The necking immediately below the capital, represents with considerable purity, the honeysuckle ornament of the Assyrians, which the Greeks borrowed from them with the Ionic order." "The pillar at Allahabad, has lost its capital, but we are able to supply the deficiency from two of the Tirhoot examples which retain their capitals, with the lions which seem to have crowned the summits of them all. In these we meet with the bead and reed ornament familiar to us in the Persian Greek architecture. The capitals are so similar to the lower members of those at Persepolis, and more especially to the bases of the columns there, as to leave no doubt of their common origin. It is almost certain that these pillars of Asoka stood originally in front of some sacred buildings which have perished."



Surkh Minar Cadool.

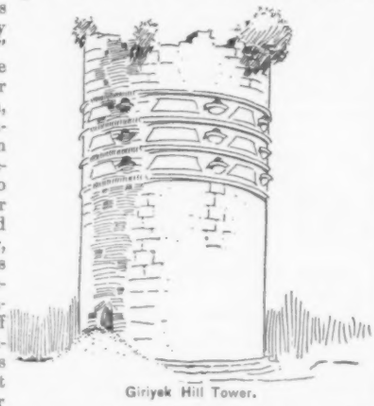
It seems strange that the sacred buildings should have perished

[1] Continued from page 146, No. 613.

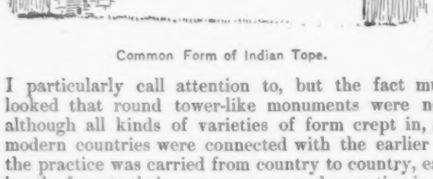
and the pillars be left. It is much easier for a solitary pillar to perish, than for a building of four walls and a roof, and these well built, too. There seems to be no other evidence to warrant this supposition, except that it was customary so to place them elsewhere — far more likely then, that they stood alone to commemorate some victory gained, or some other historical event.

But now we come to a very interesting archeological example. Miles away to the north of Afghanistan, we come upon two *built* pillars, "built monumental pillars," they are known as the "Surkh Minar" and the "Minar Chakri." "They are ascribed by the traditions of the place to Alexander the Great, though they are evidently Buddhist monuments meant to mark some sacred spot, or to commemorate some event, the memory of which has passed away. They are probably of the third or fourth century of our era, and their shape and outline exhibit great degeneracy from the purer forms with which architecture commenced in India, and which were retained to a much later period than in this remote province. There can be little doubt that their upper members are meant to be copies of the Persepolitan pillars, which were probably common also in Assyria and throughout this part of Asia."

As we travel about we become aware of the existence of hundreds of them, of different types it may be, but, nevertheless, actual built pillars, throughout the length and breadth of Mohammedan Asia. As an example, I take one of particular interest, and one about which very little is known. It is one of the earliest, and, therefore, one of the greatest importance, and considerably older than the two last named. It is situated to the south of Patna, in India, on the Giriyek Hill, and although now a ruin it is still of considerable height; possibly it was one of those attempts by which the "faithful" strove to outdo the former deeds of their brethren in the faith, by carrying up the monument of their devotion and piety to an unprecedented height, and to carry it out altogether on an unprecedented scale. This is, however, speculation, so little is known about it. It occupies a site on the summit of an abrupt cliff or precipice, a conspicuous object for miles round. In diameter it is considerably larger than others I have referred to — its particular interest to us being, its likeness in so many particulars to the round towers of Ireland: its situation is just such a one as would have been chosen in Ireland for the site of a round tower; the entrance door is placed several feet above the ground, and there are no openings or windows in the whole height of the tower as it now stands. This tower, however, rises with perpendicular walls, and is ornamented with four heavily projecting strings, with projecting stone ornaments winding in the spaces between the strings. We cannot help being struck with the resemblance in other respects to the Irish round towers. This one at Giriyek is supposed to date as far back as B. C. 600 (which is a date to be particularly noticed by us, as we shall see further on.) The great Indian topes or memorial monuments are of a different character, occupying a considerable area and rising to no great height in proportion to their diameters, but still the tower form was used, and the coins and other unmistakable proofs of their age, found in them during recent investigation, settle the dates of their erection as extending over the period of the first 600 years of the Christian era. The usual form of these topes, was a square base covering a great area, on the top and in the centre of which would be erected a tower-like structure over 100 feet in diameter, usually finished with a dome. It is the earliest rather than the latest that here I particularly call attention to, but the fact must not be overlooked that round tower-like monuments were not lost sight of, although all kinds of varieties of form crept in, and as the more modern countries were connected with the earlier ones of Asia, so the practice was carried from country to country, each nation adapting the form to their own purposes, and executing in it their own characteristics. The obelisks of Egpyt have given rise to the pillars of victory of the Romans in the West. In the East the idea bore like fruit with a similar result as to purpose. From the West there was continual intercourse with Egypt and Palestine, and Palestine, as we call it now, was but the western boundary of a realm extending as far east as to the centre of India under one monarch, so that from India to Rome, at least, there was a continual flow of merchandise, a traffic of all things under the sun. The travel necessitated by this commerce brought men of various nations together — helped in the interchange of manners, customs and ideas, each nation taking hold of a form it could appreciate, and adapting it to its own wants, and the form in question we have seen produced and reproduced, with strange pertinacity, varied by the characteristics of the people who adopted it, and this form in the course of a couple of a thousand years B. C. had but slightly altered in its proportions, the main outline was kept but the diameter of its area was increased. The pillar became a tower.



Giriyek Hill Tower.



Common Form of Indian Tope.

Again, in later years, a return was made to the pillar form, but just at the time when the pillar is developed in India, we lose all trace of it further west. True, in France, at Cussi, we find a pillar of a type quite different from the Corinthian order, which up to this had been *the* form. A pillar having an architecture of its own, of a form borrowed from India, and dating probably from 270 A. D. Its exact age, and the object for which it was raised, are alike unknown to history. It is so treated that it does not strike one as being a mere pillar, and yet the outline is not interfered with.

But the introduction of the round tower into early Christian architecture is veiled in obscurity. In the sixth century A. D. they seem to have been considered as much a part of a church as they were later. The churches at Ravenna, of that date, all have their towers, an example of which is the Church of St. Apolinare ad Classem, at Ravenna, with its circular tower and conical roof, well projecting eaves and six tiers of windows in its narrowest part. The walls are perpendicular, and the diminutions from base to summit are effected by sudden changes of diameter, not by sloping sides. It was erected at the very time that round-tower building in Ireland was in vogue; the forms, however, are totally extinct. At St. Gall, in Germany, the church erected has two detached circular towers, and it is a noteworthy fact that it is dedicated to the Irish patron Saint, St. Patrick.

Cashel, Tipperary.

The nearer we get to Ireland, the ecclesiastical towers are more and more unlike the rude structures of that country. The Gothic towers are refined and graceful and more or less ornamented, according to the dispositions of the people who built them. We find circular and octagonal towers, but few of these stand alone or merely attached to this or that church, but generally are surrounded with the church itself. The square tower takes the place of the round, the spire is added and all rudeness has been overcome. Turn to Belgium, where round towers still find favor; but here they do not stand alone, but in conjunction with square towers and the massive plain walls of the main façades. Nivelles is a church dedicated in 1045, in which the main front is flanked with two circular towers divided into stages by projecting string-courses, and carried up in slender proportions to a great height. Throughout Belgium and Germany this, indeed, seems to have been the principal characteristic of churches dating from the early part of the eleventh century — a slender tower flanking the principal façade, carried up to a great height and finished with a lofty tapering roof. But by this time (viz., the eleventh century) round-tower building in Ireland had nearly come to an end. Take England, and we find the round tower is confined to one century in connection with the churches, although it may concern us to know that in that century the round towers of Ireland were being built. For fortifications and defense round towers were occasionally used, but in most cases they differ entirely from those of Ireland. I have quoted Mr. Petrie in his remarks on Brunless Castle, but it is very probable that this form, instead of being the original, was a copy, imitated from the Irish. It is easily understood that when once the idea had taken root in Ireland intercourse with neighboring countries may very well have fostered it. That these round towers were beloved by the Irish and were peculiarly suited to them, there can be no doubt, and no other form presented itself to them as suitable to take its place.

The subject is so intricate and obscure that I put forward my theory more by way of suggestion than doctrine. There is in existence a very ancient manuscript, to be seen in the Herald's College, London, in which the great ancestor of the Saxon race, Odin, has his genealogy traced back to David, King of Israel and Judah, who abdicated about B. C. 1033, in favor of Solomon his son. Although Odin has nothing to do with the Irish round towers, the study of his descent may quicken our insight in the matter before us. There are other genealogies traceable. Upon research, I find Ireland was actually known and inhabited by descendants of David about four hundred and thirty years after his death. In the genealogies of the

Bible any one can trace for himself David's successors to a certain point, and this same list is to be found in the works of the early historians, and about these we have more details than of subsequent rulers. Of most of them we have but a few bare facts standing unsupported by any context, and one hesitates at the last moment lest one should be committing one's self. But the fact that concerns us now is that there was a king or chief, probably a near relation of King Zedekiah, who, in the year B. C. 580, fled with his wife, Tea Tephi, and his followers, from the land of Israel, and, travelling westward, finally reached the coast of Ireland, where he landed, apparently without passing through England, and as it seems, from ruling his own small company, became king or chief of the chiefs and people who dwelt there. Why he should have gone so far west, and how he came to choose Ireland as a home, is lost in obscurity, but this fact is of all importance to us. We have traced the connection between Egypt and Rome, we have gone farther and found a continual traffic between Rome and India, and now we learn there existed some sort of connection between Canaan and Ireland, and, therefore, there is a chain of commerce, perhaps, joining Ireland to India.

We have glanced at the details of monumental architecture from Egypt to Rome westward, from Egypt to India eastward, and we know the relations of Persepolis and Athens by way of stepping-stones. We have but to take a step farther and we see the rude Indian details reproduced in Ireland — the towers of Giriyek of 600 years B. C., modified, and after a lapse of a little more than a 1000 years, built again on the other side of the world. The chiefs or elders of Ireland used to meet and hold councils together. One of their council places is marked to this day by the name of the town of "Naas" (County Keldare) or the "*meeting-place of elders*," and there is still to be seen, and will be seen till the end of the world, the huge mound of earth raised, not as a monument to the dead, but as a place round which the semi-savage hordes could gather while their chiefs met in conclave in the sight of all on the summit of the mound. Here, no doubt, they met their future ruler, Heremon; from this very place spread the customs of a very far distant people, and as the centuries rolled by, the practical arts of one country were transferred to another.

Little communication appears to have existed with the civilized world for centuries, and of the details of the history of the next thousand years in Ireland — next to nothing is known, and it is not until St. Patrick visited them early in the fifth century that we find the people anything more than semi-barbarians. With his arrival and his teaching a great change seems to have taken place, the inhabitants seem as if they had been wakened up, and for the first time they begin to build in a substantial manner. As they find in themselves a power for life and death so also they find a necessity for organized tribal protection and self preservation. To effect this the men must meet for council, and no doubt they chose some central spot in each tribal district for holding such a meeting. Then came the necessity of gathering hurriedly from all parts of the districts to unite against some foe found to be drawing near — messengers must be sent and so spread the news and call together the clansmen. Their ancestors used to mark their council-place by a huge mound of earth; they, more advanced, would mark it with a more conspicuous feature. They had learned to use stone, and what they required was some strong and lofty structure that would be seen for miles in daylight by all the warriors: traditions of which they knew not the origin gave them a form particularly suited to their purpose; national characteristics so long dormant awoke and they began to build on the line of the Indian towers. They chose a conspicuous situation whence, by a signal, perhaps a beacon, and seen through the windows of the highest story, which commanded the view all round, they could rouse the clansmen, or possibly they used bells, as Mr. Petrie believes.

To this point they would gather and decide on their plan of action, and to this tower they could look as a place of security in time of temporary trouble. So the use of their towers was threefold — it marked their council-place, it was a signal-tower in case of threatened danger, and a place of security. They had no great victories to commemorate, no heroes to whose memory they could raise a monument, but they had a purpose to effect in building, and they adapted the form they had heard of by tradition and which was fostered by St. Patrick to their necessities. As they became Christians, emblems of their faith were naturally used to ornament them, and this new idea of ornamentation soon gave rise to the introduction of further detail, and in this they were schooled by the missionaries from neighboring countries. In peace, no doubt, trade was carried on near the foot of the tower. The missionary would naturally set his abode near this, the rallying point of all the clans, and thus would a church spring up at no great distance from the tower. The position of the church with reference to the tower I regard as a matter of chance, for in no two cases does the relative position agree. In some cases as at Kilkenny there are but a few feet between the two, while, as at Kildare, there is one hundred yards, and the buildings of the monastic establishments occupied the intervening ground in this latter case, and this seems to prove that immediate connection with the church was not a requirement. St. Patrick reached Ireland early in the fifth century, at which time the natives began to entertain the idea of building. They would build roughly at first and their earlier works no doubt soon perished, while those better built would, from time to time, have required repairs, and this would perhaps account for the dissimilarity of detail existing in the same tower. Kildare was an early founded mission spot, and developed into one of the most sacred religious establishments, and the tower no doubt was of very early date. By the ravages of time the conical cap decayed, and destructive elements no doubt were equally at work wherever they could get a hold. If the roofing needed repair no doubt other parts would in time do so also, and when repairs were executed the style then in vogue would have some influence on the treatment given to the work. Thus, at Kildare, when the establishment was at its most flourishing period in the thirteenth century, under the charge of the Abbess St. Bridget, we see the doorway repaired and the new work put in enriched with mouldings and other decorative work totally distinct from the rude character of the rest of the tower, so that we cannot consider such details an evidence of the original date. The battlemented parapets witness to the same thing, and if we accept this there is no reason for us to imagine that the towers are of later date than the *fifth and early part of the sixth century* A. D., except in the case of the tower of Ardmore before described, which evidently is not an original tower.

R. W. GAMBIER-BOUSFIELD, A.R.I.B.A.

THE ROYAL JUBILEE EXHIBITION, MANCHESTER.

ENGLISH ARCHITECTURE DURING THE LAST FIFTY YEARS.

AFTER "THE ARCHITECT."

MANCHESTER may well be proud of its Jubilee Exhibition. Probably never has such wonderful "machinery in motion" ever been brought together under one roof, and certainly there has never been such a magnificent collection of English pictures as that now on view in the Fine Arts Section. Every painter of any note during the last fifty years is represented, and, for the most part, worthily represented. Through thirteen rooms the visitor wanders from gallery to gallery, each more interesting and more absorbing than another, till he is almost surfeited with the richness of the feast prepared for him. Not only are the pictures themselves most admirably selected, but they are hung with the greatest possible care — the principal works of a particular artist being brought together in a manner best calculated to show them to most advantage and to enable us to judge of his place in the hierarchy of art. Time and space in such an article as this would fail to tell of the Leightons, Poynters, Burne Jones, Rossettis, Watts, Walkers, Masons, Orchardsons, and other names familiar as household words, which crowd the walls of this glorious collection. It is the cream of all the Academies and Grosvenors and other exhibitions for the last fifty years. English painters may well feel proud of their position and of their works during the Victorian era, and one cannot but admire the liberality and public spirit of the contributors that made such a loan collection possible.

The energy of the Fine Arts Committee seems, however, to have exhausted itself in the picture galleries. The sculpture is not, by any means, commensurate with its importance; many well-known names, notably that of Gibson, are conspicuous by their absence. This is greatly to be regretted, particularly when we consider that the question of color, as applied to sculpture by Gibson, was one of the most warmly debated during the reign; nor have we anything by Alfred Stevens, the Michael Angelo of the Victorian era. Architecture comes off even worse; it is relegated to a so-called architectural court, but which is really a concert-room where organ recitals are given. Along the side walls of this prolongation of the "east nave" of the exhibition are hung some three hundred architectural drawings. No attempt has been made at chronological order, except in the most feeble manner of placing a few works by deceased architects first in the list. The sequence of architectural development during the last fifty years is altogether lost sight of, so we look in vain for anything even approaching an historical record of the Victorian era. This is the more to be regretted when we consider the importance of the movements that have taken place during the period — the rise, and shall we say almost the decline, of the Gothic revival. The revival and development of English Classic under the name of "Queen Anne," and the kindred movements of the minor acts of decoration, glass-painting, furniture, etc., which have followed in its train — anything of this kind is most difficult to understand from the drawings exhibited at Manchester; more than this, and to a greater degree than in the sculpture, we miss many prominent names from the list of exhibitors. How can any exhibition of English architecture be said to be representative, wherein the works of such men as Norman Shaw, Nesfield, Bodley, Burges, Butterfield, Cockerell, Godwin, Pugin and others are absent, while such architects as Sir Gilbert Scott and Street, are only represented by a couple of unimportant drawings? It is very disappointing — the more so after the magnificent collection of paintings. One looks through the meagre array of drawings, some of them very bad *drawings*

indeed, with a sense of injury and lack of interest, a conviction that something is wrong somewhere that could result in such an unfortunate display.

Fifty years ago architecture in England was a very different thing from what it is now. As a fine art it was at a low ebb. From the end of the last century the Greek revival had been going on with more or less success. We had been trying our hardest to acclimatize the monumental art of Greece to our everyday English wants, no matter whether it happened to be a palace or a gate-lodge — and were just beginning to acknowledge what a hopeless failure it all was. We were rapidly coming to the end of our first "revival" — during which, for the first time in our architectural history, we had practically failed to impart into our work a distinctly-national character. A reaction, therefore, had set in, feebly at first, but presently to receive a mighty impetus from the first great public building of Her Majesty's reign — the new Houses of Parliament. Of this historical work, a large careful drawing of the rear front is shown at Manchester, besides Sir Charles Barry's unexecuted designs for New Palace yard — all these, especially the first, are most interesting, and with it may be fairly said to have begun the Gothic revival. A whole school of Mediæval artists, including the great Pugin, arose during its progress, and from this time onward our second "revival" grew in strength, and its works in number beyond all precedent. For the first half of the Queen's reign the "national" style was everything, not that, as we shall see presently, the Renaissance architects were beaten out of the field altogether; far from it; even the designer of the Houses of Parliament himself was one of the strongest of their number, his Classic works probably, as art, being of a far higher standard than ever he reached in Gothic. But the "revival" is the first important event in the architectural history of the reign. It is curious and deeply interesting to observe how, at its first inception, the later types of English-Gothic were taken as its models; how, under the influence of Ruskin's writings and the publication of many admirably-illustrated works on Continental-Gothic, it passed through the various phases of Italian and French, and even performed a kind of harking-back process to our own earlier types, and then slowly but surely returned, in the main, to our later English-Gothic once more. As we have said, it is a pity that so few of the famous men who took part in all this historic work are represented at Manchester. Of Sir G. G. Scott we have only his houses at Broad Sanctuary, Westminster, and St. George's church, Doncaster (built about 1856). Of Mr. Street, we have only his northwest porch, Bristol Cathedral, and his designs for the Law Courts for the Thames Embankment site (*the* site), both beautiful drawings by his own hand. Among the earlier workers (some of whom, indeed, are still with us), we have no names of any note, with the exception, perhaps, of Mr. B. Ferrey, who is represented by his St. Stephen's Church and Schools, Westminster, in geometric Gothic, and built about 1846, and Wyunstay, a country house in North Wales, designed in a kind of French Classic, of Mr. Pearson, who has been building churches for over forty years. Of Mr. Butterfield, his contemporary all that time, there is nothing — a most unpardonable mistake in an exhibition with any pretentions to be representative. The Classic men of the first half of the reign fare but little better. Decimus Burton's Charing-Cross Hospital and United Service Club, Pall Mall; Sydney Smyrke's Carlton Club, Pall Mall, his spoilation of the old Burlington House by an additional story for the Royal Academy, and his Pavilion for Prince Albert, with Edward Walter's Free-Trade Hall, Manchester, almost exhaust the list. None of Sir Charles Barry's wonderful Classic clubs and houses are here, nor anything of Professor Cockerell's except a fine drawing of his own for the sculpture in the pediment of St. George's Hall, Liverpool. St. George's Hall itself — the greatest Classic building of modern times — is not shown; neither is the Royal Exchange, London, by Tite, the British Museum, by Smirke, nor the Fitzwilliams Museum, by Basevi. All these had been done while the Gothic revival was yet in its first growth, before it had made any impression on the domain of civic architecture. Such was the force of the revival, however, and the ardor of it advocates that it could not be expected our public buildings would long remain uninfluenced, and curiously enough it was reserved for Manchester to lead the way. Mr. Alfred Waterhouse, with the Assize Courts in 1859, and again with the Town-Hall ten years later, showed what could be done with secular Gothic. He being Manchester's most famous architect, we expect him to be well represented, and we are not disappointed. His principal works from the Assize Courts to the National Liberal Club, on the Thames Embankment, except the Manchester Town-Hall, but including the Natural-History Museum, and the Technical Institution at Kensington, and Eaton Hall, the Duke of Westminster's country palace, near Chester, are shown in his own drawings. They are the most typical works of the Victorian era, thoroughly eclectic in character, full of purpose, and distinctly nineteenth century in tone and feeling in spite of the particular phase of Gothic or Renaissance employed. They represent more than any other the versatility of the architecture of the day, and nowhere could we hope to find this more appropriately shown than in Manchester, or more ably carried out than by one of her sons. Indeed, it might almost be called the "Manchester School," and has plenty of followers. Mr. Waterhouse has probably had the largest practice of any architect of the age, and the most important commissions. Had he been as great artist as utilitarian, it is more than probable he would have revolutionized English architecture as greatly as did Inigo Jones or Wren. As it is, his work but reflects too faithfully the passing fancies of the hour, the latest of which is the revival of "terra-cotta" as a building material even for the largest and most monumental public building. In spite, however, of these extraordinary works by Mr. Waterhouse, in spite of Mr. Street's Law Courts (or shall we say because of them?), and of many other clever works by clever architects the strength of the Gothic revival still lay in its ecclesiastical aspect. Here all through the reign it may be said to have grown from strength to strength until, after its return to more strictly English types, we have among us men capable of designing work which can hold its own with the best periods of the Middle Ages. Not so much in the letter, for different requirements have produced different results, but in the true spirit of the style, and the artistic power with which it is handled, we have become masters of church architecture in English-Gothic.

The secular and domestic side of the revival has always been its weakest. The reason is not far to seek. The life of the Victorian era is not that of the Middle Ages. Later types were, therefore, more and more followed and developed until we have had a third "revival," that of the so-called "Queen Anne," or English Classic. Beginning about the middle of the reign with country houses of late sixteenth and seventeenth century type, the movement gradually assumed a more Renaissance feeling, until at the present time the Classic element is once more attaining the ascendency. Of the works of the men who were mainly instrumental in bringing about this "revival" — second only (if that) in importance to the Gothic which preceded it — the works of men like Mr. Philip Webb, Mr. Nesfield, and Mr. Norman Shaw — none are shown at Manchester. There are several, however, by younger men, followers of the school, which illustrate the enormous change that has of late years come over the spirit of English civil and domestic architecture. Of these the works of Graham Jackson, at Oxford, occupy a prominent place — notably, his well-known Examination Schools. Similar in spirit, though somewhat different in type, we have the works of Mr. Champneys, at Cambridge, Oxford and Harrow; Mr. Collcutt's Wakefield Town-Hall, and other works in London; Mr. Brydon's in London and Chelsea, which show the gradual Classic tendency of the revival until we come to the Municipal Building, at Glasgow, by Mr. William Young, a Renaissance structure of the most pronounced type, represented at Manchester by an elevation and perspective. This latter, the largest public building now erecting, brings the record down to the date of the Queen's Jubilee. Of the many important and civil works erected during the latter half of her reign only a few are here. Of these, as representing the Classic tradition, which had never been wholly swamped by the Gothic revival, those by the sons of Sir Charles Barry are very interesting: Wykehurst, Sussex, and the City Terminus and Hotel, Cannon Street, London, by E. M. Barry, are shown; — while by his brother Charles there are Dulwich College, Burlington (new) House, Piccadilly and Clumber House, the Duke of Newcastle's big country seat; the latter, shown by plans, elevations and a perspective view of the great hall, is a splendid specimen of a large Renaissance mansion, rivalling the Gothic Eaton Hall for size and importance. Like it, also, it was a rebuilding and restoration of an older house.

As might be expected, the Manchester architects are well represented. We have the Royal Exchange (interior and exterior) by Messrs. Mills and Murgatroyd, the Police and Sessions Courts by Thomas Worthington, the Manchester and Telford Bank, by Henry Lord, and other public buildings, and if we are anxious to see what can be made of a Manchester warehouse, we have a drawing of the huge and well-known "Watts," by Messrs. Travis and Manghall, and a whole group by Mr. Edward Walters and others. These enormous warehouses are characteristic features of Manchester street architecture, like nothing else anywhere, and they all belong to the Victorian era.

Our empire beyond the sea is not forgotten, and it is here represented by the works of Mr. Emerson in India — including his well-known Muir College in Allahabad, All Saints' Church, Allahabad, and the Takhtsingji Hospital, Bhavnagar, all works distinguished by their clever adaptation of Indian architecture; while Mr. John O. Scott sends us views of his cathedrals at Lahore and the Falkland Islands — the former a striking work in red brick, of lofty proportions and with two western towers.

Thus, though far from adequately, the display gives us an outline of the development of architectural art during Her Majesty's reign, and looking back over the fifty years' work we are confronted with a result never before found in our architectural history, that we seem to have a multiplicity of styles all flourishing side by side. We have witnessed two distinct and important revivals, one Gothic, and in the main ecclesiastical, the other Classical, and in the main domestic, but both eclectic in the highest degree. Moreover, some process of amalgamation has also been going on in which the forms and details of the one have been adapting themselves to the principles of construction of the other. Whether the movement in favor of English Classic may yet result in the development of a Victorian style in the future it is impossible to say. The tendency, if towards any result at all, seems to be in the mean time to take it for granted that we have one style for the church and another for the world of every-day life, a Sunday and a week-day style, which are becoming more and more distinct from each other; so much so that we find the same men practising both with equal skill, but strictly reserving each for its own purpose. We venture to think the Victorian era stands alone in

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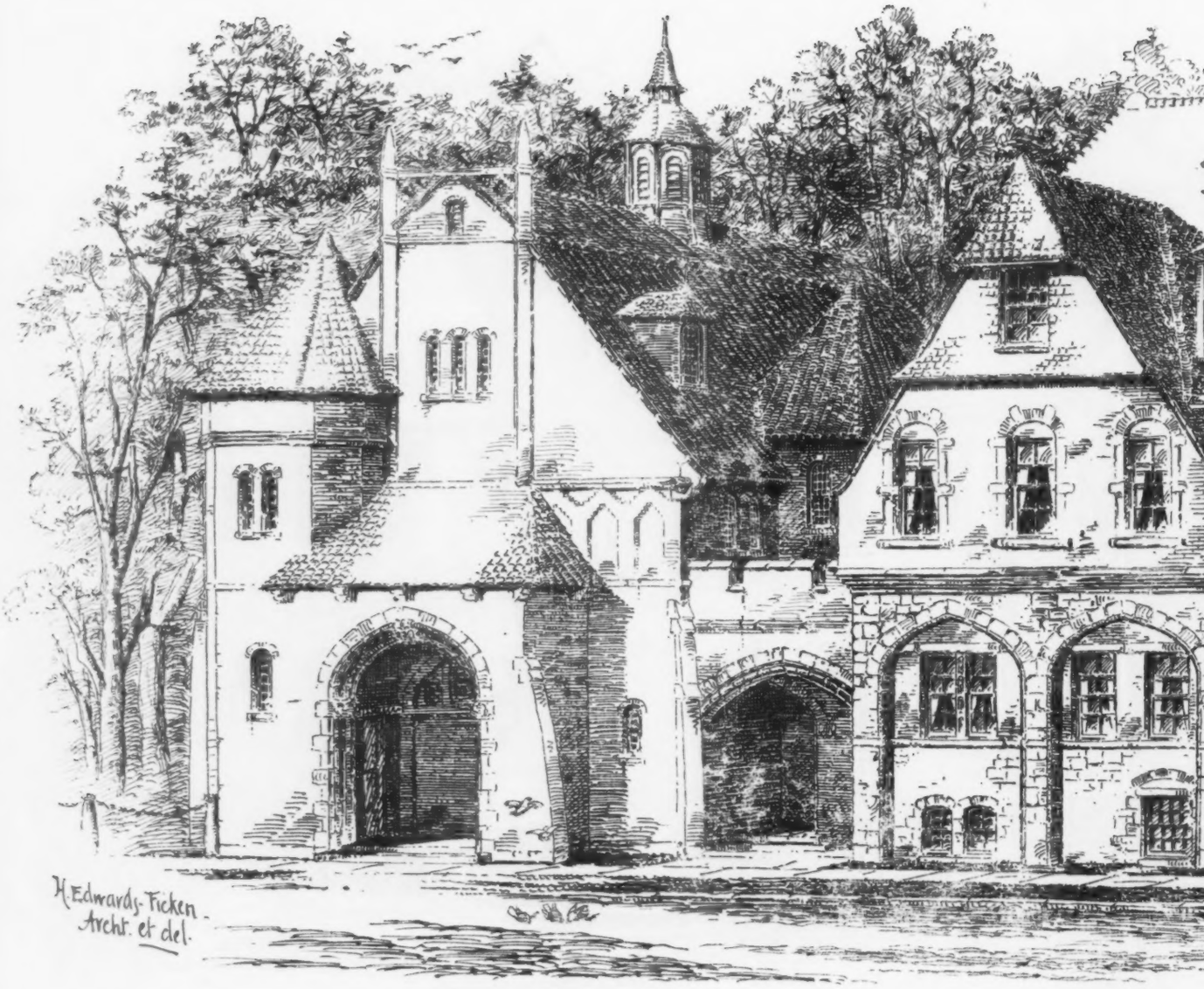

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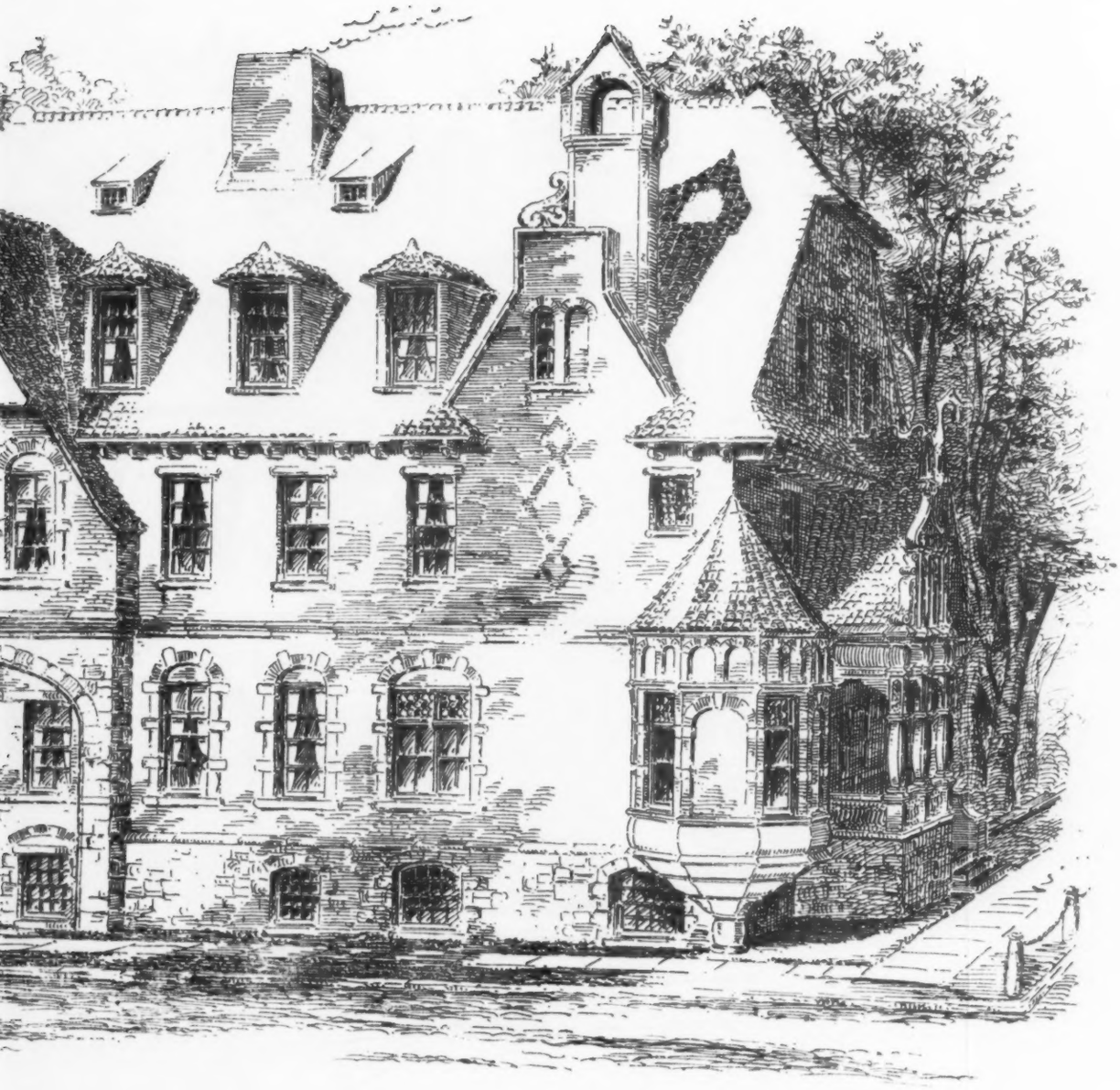

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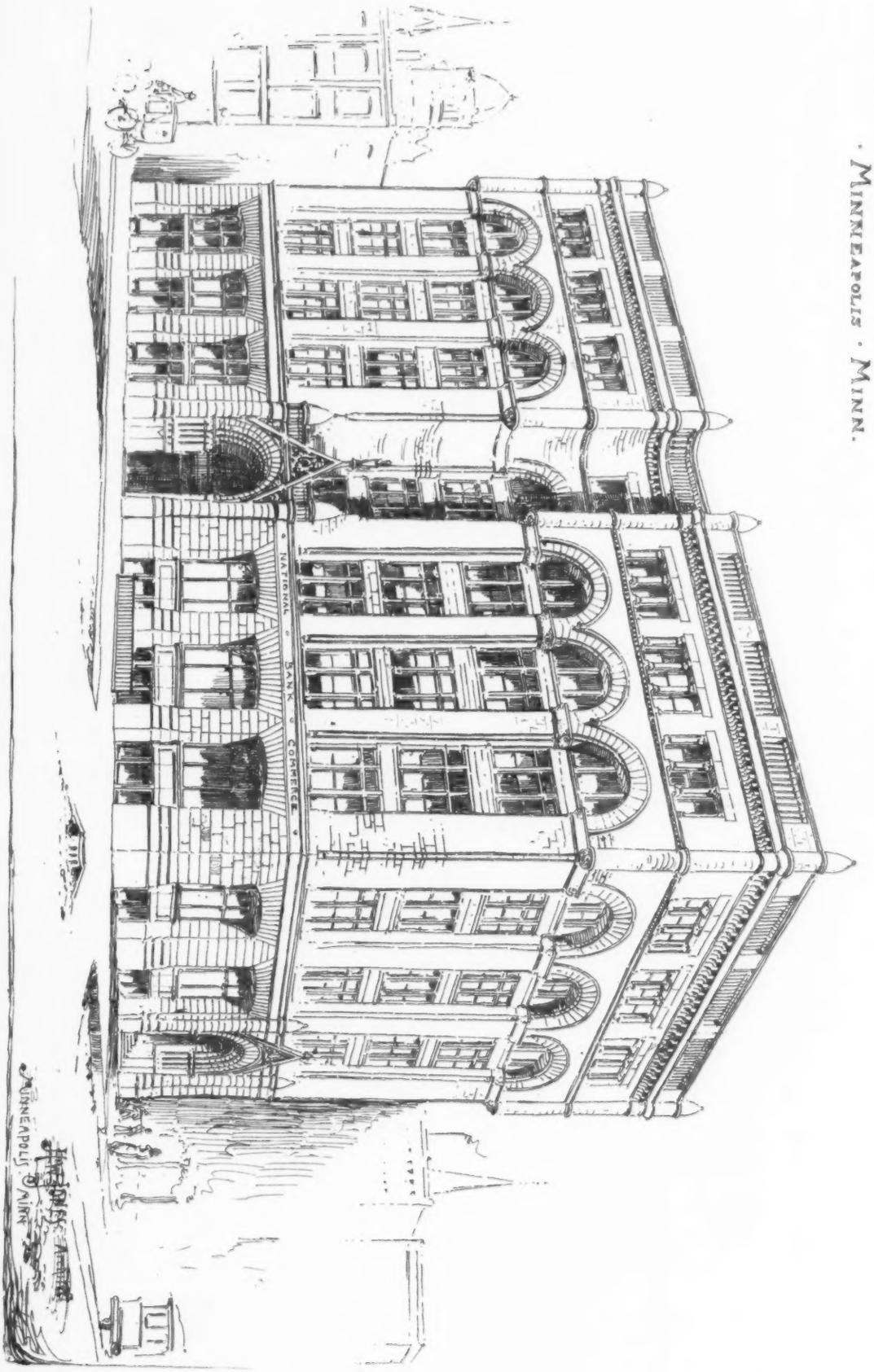

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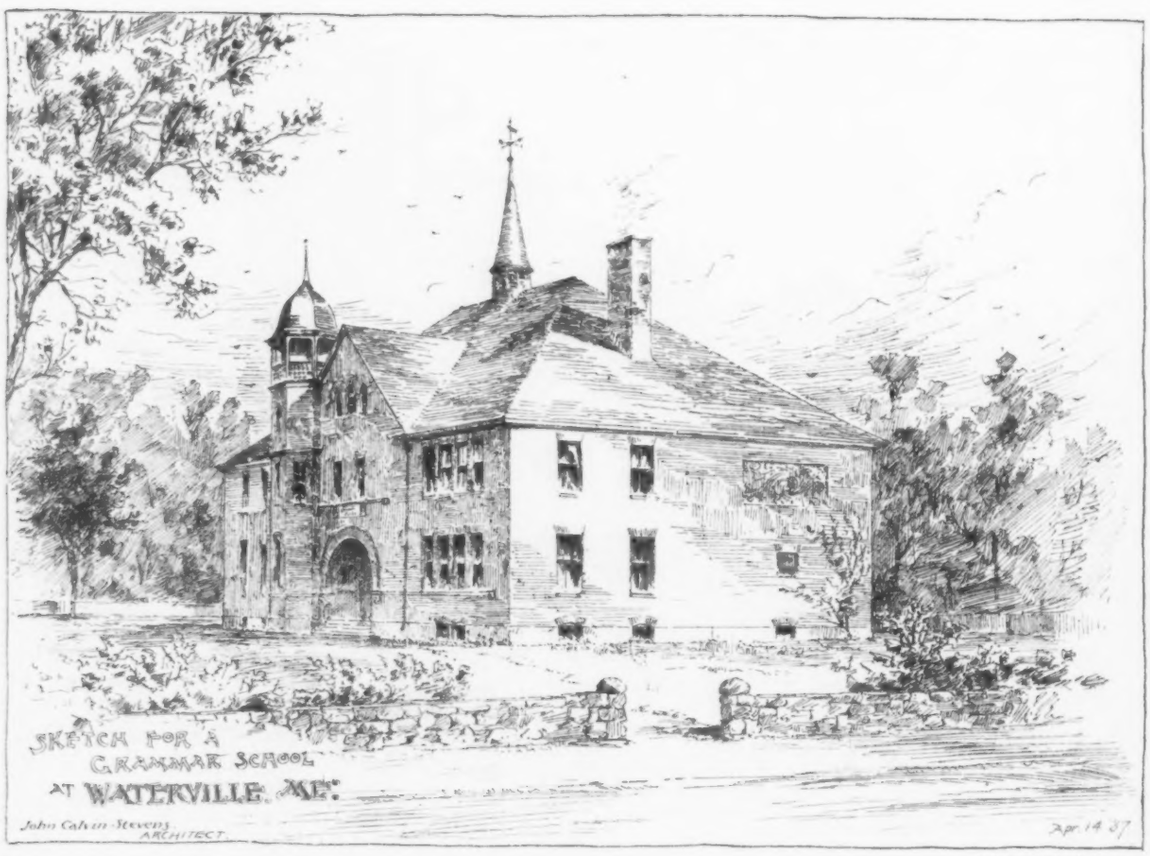

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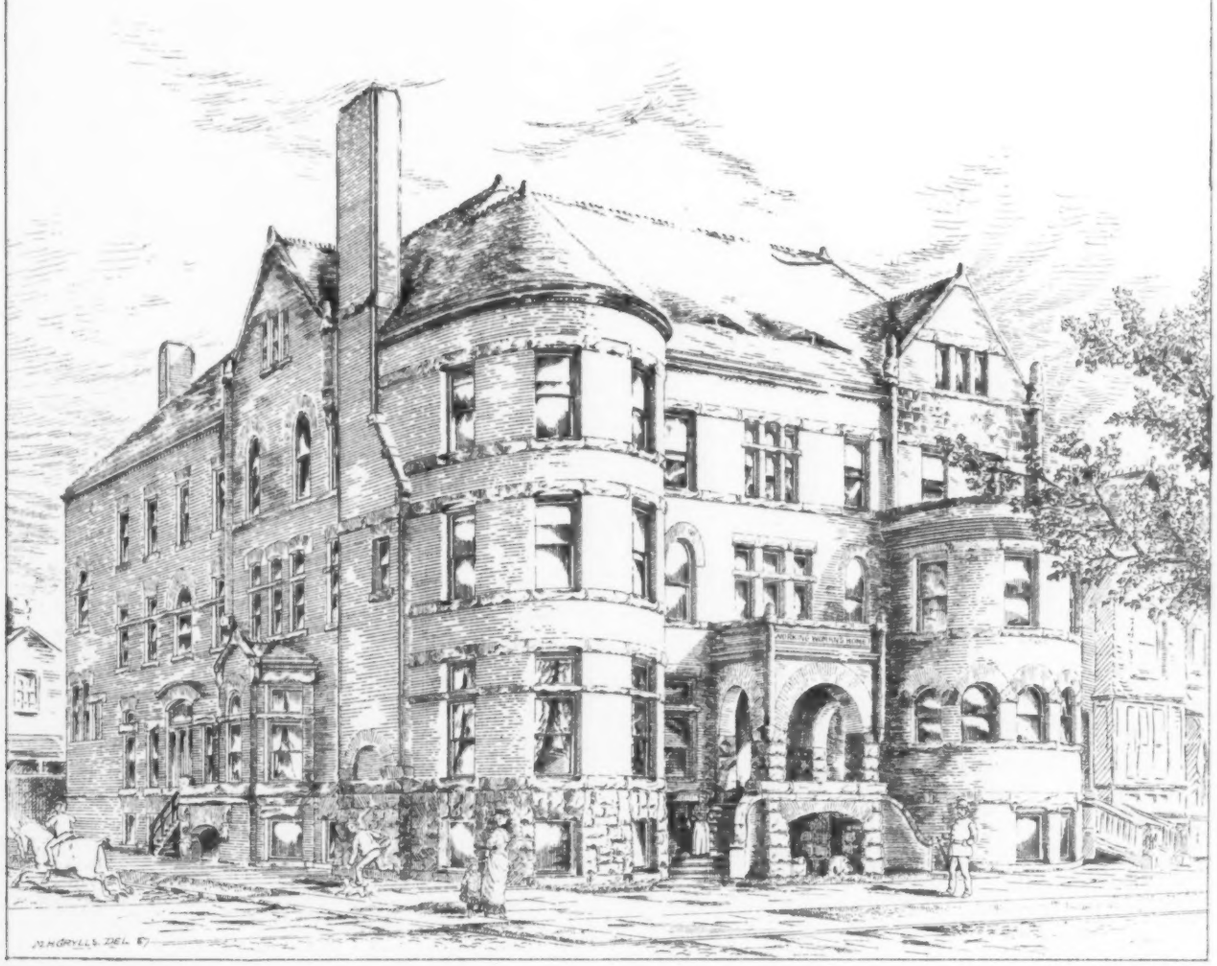
W. G. Malcomson Archt
Detroit Mich Aug 28th 1887



Lithotype Printing Co. Boston

such a characteristic. Only within the last fifty years has it received such decided, and lately, one might almost say, such accepted acknowledgment. True, all through the Greek revival the Mediæval tradition had never quite died out. Gothic churches of a sort were still erected here and there, but the wave of Greek touched alike church and hall, town and country architecture. Now we find the Gothic revival has virtually abandoned the domain of civil work, and the new Classic has apparently accepted the compromise, since its promoters never attempt churches in their favorite style, but retreat at once to the safer and more familiar paths of English-Gothic. Even a pronounced Goth, like Mr. Bloomfield, when he comes to build a bank in Fleet Street, and that, too, under the shadow of Mr. Street's Law Courts, takes refuge in Classic, and Mr. Young, when designing a town church for Chelsea, falls back at once on Gothic, as if by instinct, yet he is a Classicist in everything else! It is an extraordinary state of things, one which may be well worthy of the thoughtful attention of all those who have the best interests of their art deeply at heart, but on the outcome of which it will be useless to speculate. The Victorian era is not yet closed. Judging from its activity in the past, its knowledge and power in the present, we may with confidence leave its future to the historian of the century. Writers are fond of contrasting it with the Elizabethan age in art and in letters: let us hope its architecture may yet come bravely out of the comparison with honors.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

THE CUSTOM HOUSE, QUEBEC, CANADA.

[Gelatine print, issued only with the Imperial Edition.]

THE BUILDING FOR THE STONE TRUST ASSOCIATION, NEW HAVEN. MR. H. EDWARDS-FICKEN, ARCHITECT, NEW YORK, N. Y.

THESE buildings now erecting on the corner of Hillhouse Avenue and Grove Street by the Stone Trust Association are for the use of a secret society in the scientific department of Yale University.

The cloister part of the buildings will be occupied by members of the society, and the chapel will be its meeting place.

The building will be of local New Haven red stone, with red-tile roof and red tiles facing the gables. The main entrance to the cloister will be on Grove Street, through a pillared and sculptured porch, opening on a large hall, columned and beamed overhead, and with a large carved brick fireplace at one end, the main stairs at the other. The general plan of this building is a large study between two bedrooms, each study having its own open fireplace. Bathrooms and all other conveniences are provided on each floor, and every attention has been paid to light, ventilation, heating and plumbing.

THE NATIONAL BANK OF COMMERCE, MINNEAPOLIS, MINN. MR. H. W. JONES, ARCHITECT, MINNEAPOLIS, MINN.

THIS building is to be entirely fireproof, and fitted up in the best manner possible for a first-class office-building. The material will be brownstone, with a brown granite base. The bank quarters will be on first floor at the corner of the building, and will have its own entrance, the main entrance being for the remainder of the building, and will be on a level with the sidewalk, the elevators being entered on the same level. All the plumbing will be confined to the basement, the water-closets being under the sidewalk. The cost will be about $175,000.

THE BALTIMORE CLUB-HOUSE, BALTIMORE, MD. MESSRS. J. A. & W. T. WILSON, ARCHITECTS, BALTIMORE, MD.

THE Baltimore Club-Building has a width of 34′. All stonework is of dark red Potomac sandstone. Red brick above first story especially made for this work, 15″ long. Windows faced with moulded brick, and transom bars and lintels of red terra-cotta. Dormer of hammered copper. Roof of dark glazed tiles. Vestibule of polished red Georgia marble.

HOUSE OF EDWARD REESE, ESQ., BALTIMORE, MD. MESSRS. J. A. & W. T. WILSON, ARCHITECTS.

THIS house has 25′ frontage. The materials are North River bluestone, with selected weather-stained faces, brown brick and dark glazed-tile roof. Dormers lead; vestibule finished in polished Knoxville marble.

ACCEPTED DESIGN FOR THE WORKING-WOMEN'S HOME, DETROIT, MICH. MR. W. G. MALCOMSON, ARCHITECT, DETROIT, MICH.

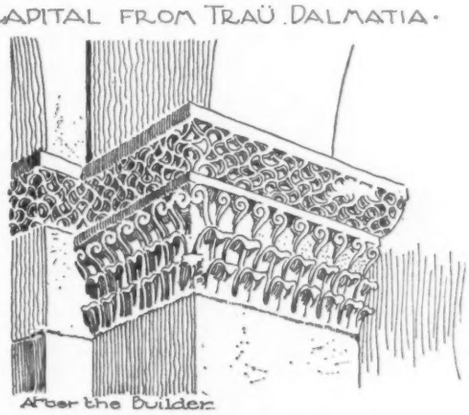
THIS building is to be located on northeast corner of Adams Avenue and Clifford Street. Principal front on Adams Avenue 80′; Clifford-Street front 100′. Materials: red brick and Berea stone trimmings. Principal rooms finished in red oak; balance, pine. Estimated cost, completed and heated by steam, about $28,000.

HOUSE OF W. P. BURBANK, ESQ., PITTSFIELD, MASS. MR. H. NEILL WILSON, ARCHITECT, PITTSFIELD, MASS.

THE material of which this house is composed is as follows: first story, rough boulders, all colors, from old fences in neighborhood; second story, red wood (cedar) shingles, oiled and creosoted; trimmings painted dull yellow; interior finish of white-wood, painted. Cost $22,000.

SKETCH FOR GRAMMAR SCHOOL, WATERVILLE, ME. MR. JOHN CALVIN STEVENS, ARCHITECT, PORTLAND, ME.

BUILDING MATERIALS.[1]—VI.



HYDRAULIC CEMENTS. (*Continued.*)

THE great improvements that have been made in the manufacture of Portland cement within the last twenty-five years, owe their origin in a great measure to its having been employed in the construction of sewers for the Metropolitan Drainage, under the superintendence of Mr. Grant, who, with the view of obtaining the best possible article that could be manufactured, devised certain definite tests by which the quality of supplies could be controlled. The terms of his first specification were "that it should weigh 110 lbs. per striked bushel, and that briquettes made up with water and having a minimum area of 2¼ square inches, after immersion in water for seven days, should not break under a tension of 400 lbs., equal to 177 lbs. on the square inch." Such a limit appears to be absurdly low, now that we are accustomed to cements which well bear a tension of from 400 to 450 pounds on the square inch, and yet, some eminent cement manufacturers of that time gave it as their opinion that a strain of 133 pounds on the square inch was as much as cement could be expected to stand. Although the seven-day test with neat cement is still very generally adopted on account of the inconvenience which a further delay in ascertaining the quality of supplies would entail, it is admitted that with hard-burnt, slow-setting cements, a period of twenty-eight days would allow of much more satisfactory results being obtained. Tests should also be made with a mixture of one part of cement and three parts of clean, sharp sand; briquettes made of this mixture should be put in water twenty-four hours after they have been made, and at the expiration of twenty-eight days bear a strain of 250 pounds on the square inch. It is important that the same description of sand should be employed in all cases, the particular kind of sand now very generally adopted is that obtained from Wortley Field sand-pits, near Leighton Buzzard. The grains of sand should also be of uniform size, and only those portions should be employed which have passed through a sieve of 900, and been retained by one of 1,600 meshes to the square inch. Inasmuch as the finer grinding of any cement makes its weight per bushel lighter, the actual specific gravity of the cement (which should be 3.1) is now regarded as a better criterion of its quality.

A new method of calcining cement has been proposed by Mr. Frederick Ransome, which yields very promising results. It consists in the use of a furnace composed of a revolving cylinder placed in an inclined position, and lined with fire bricks or other refractory material in such a manner as to produce a number of parallel longitudinal ridges, or "feathers" through the entire length of the cylinder. The fuel employed is gas obtained from slack coal, by means of an ordinary gas producer, the air necessary for its combustion passing through a regenerator heated by the waste heat from the revolving furnace. The slurry is lifted to a hopper placed at the upper end of the cylinder, from which it falls in a steady shower through the flame of the burning gases, which enter at the lower end of the cylinder. The slurry, as the cylinder revolves, is caught by the "feathers," and is lifted until the feather attains such an inclination

[1] A lecture by W. Y. Dent, F.C.S., F.I.C., read before the Society of Arts, and published in the *Journal* of the Society. Continued from page 150, No. 613.

as to shoot it off to the bottom again, but owing to the inclined position of the cylinder at every revolution, gradually nearer to the lower end; this occurs repeatedly, until the completely-calcined cement falls into a receptacle at the lower end of the cylinder, which is rotated at such a speed as to allow about half-an-hour for the cement material to pass from one end of the cylinder to the other. It is obvious that such a method must possess several important advantages:

1. The cement when it leaves the cylinder is in the condition of a coarse powder, some of the particles being about the size of beans, instead of being in heavy lumps of hard clinker; it is consequently capable of being easily ground to a fine powder, which is not the case with the ordinary cement clinker.

2. A very considerable saving of fuel is effected, the consumption being estimated at not more than one-third of that required in ordinary kilns.

3. The temperature is completely under control, and the cement is not exposed to a high temperature for a longer period than is necessary for perfect calcination, whilst every particle is subjected to the same amount of heat; the cement is consequently of a more uniform character.

4. The plant required is of a less expensive character than is necessary with ordinary or circular kilns, a cylinder of about four feet in diameter and twenty feet in length, being regarded as capable of turning out as much cement as a thirty-ton ordinary kiln.

The most important point to be determined in the analysis of Portland cement is the proportion of lime, which in a well-made cement should be from fifty-eight to sixty-two, or perhaps sixty-three per cent. Any excess of lime should always be regarded with suspicion, inasmuch as it is well known that by increasing the proportion of lime, the strength of briquettes made of such cement at the end of seven days may be augmented. An excessive amount of lime, however, cannot be employed without incurring the risk of the cement cracking and becoming disintegrated.

When the lime is associated with magnesia, the magnesia should be regarded as to some extent taking the place of the lime and the quantity of the lime should be proportionally diminished. A well-prepared Portland cement, such as is made on the Thames or the Medway, should not contain any appreciable quantity of magnesia, say about one per cent. Although any large proportion of magnesia in Portland cement cannot be considered desirable, yet it must not be forgotten that magnesia is capable of forming hydrates of great permanence and hardness, and that some very good hydraulic cements contain as much as eight per cent of magnesia, such, for example, as the well-known Rosendale cement of the United States of America.

There can be little doubt but that the assertions that have been frequently made as regards the tendency of cements containing magnesia to disintegrate may sometimes have arisen from overlooking the fact that the results observed might be due to excess of basic constituents in the cement. In a recent statement put forward as to the injurious action of magnesia, the cement referred to contained seventy-two per cent of lime and magnesia, and it could scarcely be regarded as extraordinary that such a cement should prove a complete failure, since it is well known that such a proportion as seventy-two per cent of lime would render any Portland cement so unsafe as to cause it to be condemned.[1]

One of the materials of which it has been attempted to make cement similar in its character to Portland is blast-furnace slag. Many endeavors have been made from time to time to utilize a material for which, until a few years ago, no application could be found except for road-making purposes. A great number of patents have been taken out with the view of accomplishing this object. In 1864 the plan of subjecting the melted slag (as it runs from the furnace) to a powerful jet of air or steam, was proposed by Mr. Geo. Parry, which causes the slag to assume the appearance of wool. This slag-wool can be used for a variety of purposes, and, being a bad conductor of heat, is well adapted for use as a covering for boilers' steam-pipes.

When we recollect that this slag consists principally of silica, alumina, and lime, and that the silica is in a condition in which it is more readily capable of entering into new combinations than it is when in the form of clay, it might be expected that we have in blast-furnace slag a material peculiarly calculated to be of service in the manufacture of cement, artificial stone, or mortar. Accordingly we find that, as far back as thirty-seven years ago, attempts were made to utilize slag for such purposes. In 1850 a patent was secured by Mr. Jos. Gibbs for the manufacture of mortar and artificial stone by mixing ground slag with lime. The subject was subsequently taken up by some of the owners of ironworks, and a method for working slag was devised by Mr. Chas. Wood, of Middlesbrough, by the adoption of which he estimated that slag could be reduced to the condition of slag-sand at a cost of a few pence per ton.

The molten slag is made to flow into a bath of water, which is kept in a state of violent agitation by a revolving cylinder provided with a series of perforated screens or buckets, by which the slag is separated into small particles and carried up into a spout, which conveys it into trucks placed to receive it, the water falling back into the bath through the perforated screens. Many thousands of tons of slag-sand have been manufactured in this manner, from which mortar is prepared by grinding the slag with five per cent of lime, the mortar setting so quickly that it is necessary to use it within twenty-four hours of its having been made. Bricks are also manufactured in vast quantities by mixing the slag-sand with ten per cent of slaked lime, and pressing the mixture into bricks, which, when dry, are ready for use, without requiring to be subjected to the heat of a kiln.

Attempts have long been made to manufacture a cement resembling Portland, from slag-sand, but until recently without leading to any very successful result. If care be taken in selecting the slag-sand, in ascertaining its composition, and in mixing with the proper proportion of chalk, very excellent cement may be produced, for the calcining of which Ransome's revolving cylinder is especially adapted. The slag-sand cement, prepared in a proper manner by what is called the homogenized-cement process, as promoted by the Improved Cement Company, certainly gives results which are somewhat surprising, since *briquettes* made of this cement, whether tested neat at the end of seven days, or mixed with three parts of sand at the end of twenty-eight days, will stand the same tension-test as good Portland cement. At the same time it must be borne in mind that great caution is necessary in adopting a cement of this nature, more especially when it is recollected that blast-furnace slags differ materially in their composition, and it is therefore not surprising that the introduction of a cement of this unusual character should have much to contend with as regards want of confidence in its power to retain its good properties for any length of time, more especially as previous experience on the subject of cement would tend to lead to the conclusion that no sufficient combination of the silica and alumina with the lime could be brought about by mechanical mixture alone, however intimately the substances might be incorporated with each other. It would appear, however, that when care is taken to see that the constituents of the cement exist in suitable proportions, a very serviceable article is capable of being produced. The cement is prepared by simply mixing together, in the most intimate manner possible, slag-sand and dry well-slaked lime, without subjecting the mixture to any firing process. The secret of the success that has attended this method of making cement would seem to be the result of the very intimate mixture that is obtained by means of a revolving metal cylinder containing a number of iron balls, favored by the soft and somewhat spongy character of the slag-sand. In this, as well as in all new descriptions of cement, time is necessary to discover its defects or establish its merits. If a cement made in so simple a manner will continue to increase in strength for as long a time and to the same extent as Portland cement, this slag-sand cement must become an important branch of manufacture; but at present its lasting qualities are not sufficiently established to allow of its being employed for any important work without the engineer incurring a little responsibility. It has, however, been clearly proved that a very excellent material, capable of being used as cement-mortar, can be made out of slag-sand by this method.

Some excitement has lately been created by numerous letters which have appeared in the newspapers on the results produced by mixing sugar and lime together, for the manufacture of mortars and cements. Unfortunately, these communications have seldom given sufficient details of the nature of the experiments made to enable any one to say how far the results described are due to the sugar or to other causes. A mixture of sugar and pure lime made into a paste will set very hard upon the surface, but the interior of the mass remains in a friable condition, and will not withstand the action of water. Sugar may possibly be used with advantage where only pure lime is to be obtained, but it is not probable that any such mixture will compete in strength and durability with a good hydraulic lime.

Amongst the most recent novel applications of cement are those of Mr. Wilson, of Grays, Essex, who, by enclosing in the cement wire-netting and hoop-iron, so strengthens it as to enable him to construct cisterns and drain-pipes that will stand very rough treatment, without being inconveniently heavy. He also constructs telegraph-poles, as well as a variety of other articles for which cement has hitherto been considered as unsuitable.

PLASTER-OF-PARIS.

The setting of cements like Portland and Roman is due to combinations of a somewhat complicated character, the precise nature of which is far from being distinctly understood. It is altogether a different question with respect to plaster-of-Paris which is due to hydration only. Gypsum is sulphate of lime combined with water, and when exposed to a temperature of about 360° Fahrenheit, the water is driven off, and anhydrous sulphate of lime, known as plaster-of-Paris, remains. Sulphate of lime is found in nature in the form of transparent prisms, as selenite, and in opaque and semi-opaque masses, as alabaster and gypsum; it is also found not in combination with water, in which condition it is termed anhydrite. The principal beds of gypsum belong to the Tertiary system, the finest of these deposits being those of the Paris basin in the district of Montmartre. In this country it is found most abundantly in the countries of Derbyshire and Nottingham, extensive plaster works being carried on in the vale of Belvoir, a short distance from Newark, where the gypsum occurs in beds varying in thickness from a

[1] From a recent report of Professor Brazier on the cause of the failure of some Portland cement used in the construction of a graving dock in Aberdeen Harbor, it would appear that the reaction which takes place between the magnesium chloride contained in sea water and lime may, under certain conditions, be sufficient to cause the disintegration of some descriptions of Portland cement, the lime in the cement being dissolved.

few inches to three or four feet. The only preparation which the gypsum undergoes previous to calcining consists in chipping off the outer portions, which, being contaminated with earthy matter, would injure the color of the plaster. With all the varieties of gypsum there is a tendency to assume a crystalline character, and accordingly, as it possesses less or more of this structure, it is described as dense, granular, or fibrous. The white translucent alabaster which is used in statuary is a compact mass of crystalline grains, so soft as to be capable of being easily turned or cut. The altar-piece in the chapel at Chatsworth is a fine example of alabaster work. Gypsum, when finely ground, is known in the color trade as terra-alba, and is used to a considerable extent in the manufacture of colors.

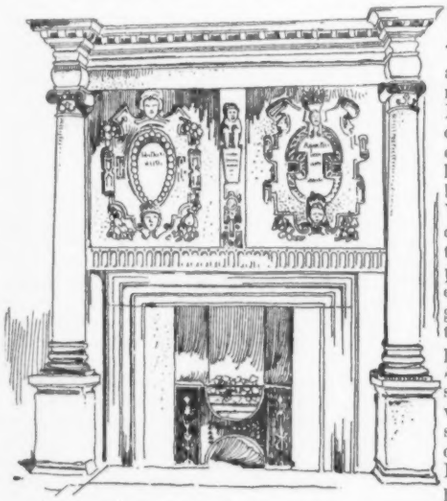
It is however, in the form of plaster-of-Paris that sulphate of lime is of the greatest value in commerce and in the arts. For its production several methods of heating the gypsum are adopted, a flat kiln or oven being generally employed in this country. After raising the kiln to a temperature of a low red heat, the firing is discontinued, and it is charged with the lumps of gypsum, which, after about eighteen hours, has lost its water of hydration, and become converted into plaster-of-Paris. The kiln is sometimes worked continuously, and is heated by flues which are carried round the chamber in which the gypsum is placed; when this method is adopted, it is necessary that care should be taken that the temperature does not rise too high, and that the plaster is withdrawn as soon as the water has been expelled. Considerable experience is required in carrying out this process (which is simply one of dehydration) successfully, for although when the temperature is kept within proper limits the plaster possesses the power of reabsorbing its water with avidity, yet this power is diminished if the gypsum be overheated. When subjected to a red heat for some time, the gypsum increases in density, and if this temperature be continued, it gradually assumes the character of natural anhydrite, which does not possess the properties of plaster-of-Paris. It is safer not to drive off the whole of the water rather than risk exposing the gypsum to too high a temperature, as the retention of a small portion of its water does not prevent the plaster from reabsorbing the water that has been driven off.

Although plaster-of-Paris does not chemically combine with more than one-fourth of its weight of water, yet it is capable of forming a much larger quantity into a solid mass, the particles of gypsum being converted into a network of crystals enclosing mechanically the remainder of the water. The value of plaster depends upon this property of setting with a very large quantity of water, for if the plaster were not capable of being used in the condition of a thin paste, its value as a material for taking casts would be greatly diminished; the thin plaster, when poured into a mould, fills every cavity, and the slight expansion which takes place in the act of setting forces it into the finest lines of the mould. Sulphate of lime is soluble in water to the extent of one part in four hundred, the solubility being but little influenced by temperature. It is on account of this solubility in water that cements which consist in a great measure of plaster-of-Paris are incapable of bearing exposure to the weather.

By mixing gypsum with a small quantity of certain salts, such as alum, borax, and sulphate of potash, it is rendered capable of bearing a higher temperature than ordinary gypsum, without injury, and the character of the plaster produced is altered; the mixture setting into a harder material or cement, of which we have examples in the cements known as Keene's, Parian and Robinson's.

[To be continued.]

CRIMINAL FIRES IN THE UNITED STATES.



MANTEL. WRAXALL MANOR. ENG.
AFTER THE BUILDER.

FROM a paper entitled as above, read at the annual meeting of the Fire Underwriters Association of the Northwest held at Chicago, by Franklin Webster, editor of *The Chronicle*, the following copious extracts, embodying the greater part of the paper are printed in the *Spectator*. The subject is one which Mr. Webster, as compiler of *The Chronicle* Fire-Tables, is peculiarly fitted to discuss, and his treatment of it will be found highly interesting, we believe:

We have in the United States an annual loss by fire which is moderately estimated at $100,000,000. One part of this loss is due to fires whose causes are purely accidental; another and a large part is due to fires originating from carelessness in its countless forms; a third part, also considerable, is due to fires which are the result of deliberate crime.

The crime of arson or incendiarism or "fire-raising" — whatever may be the distinction between these names in popular usage or legal terminology, they mean the same for the present purpose — has always and everywhere been regarded as one of the basest in the calendar. Considered simply as a thief who steals from society, a thief who often takes that "which not enriches him," the incendiary is more to be dreaded than any other thief on the face of the earth. The property he takes away is gone forever. There is no way of wooing its return by a promise to ask no questions. It is hopelessly gone, and society must stand the loss. The burglar, with knowledge of locks and skeleton keys, may, to a limited extent, levy on the goods of others, but the incendiary's torch is much the superior tool. There is, practically, no limit to the property it places at his mercy. With it he can reach the treasury of society, and, as we must admit many times has been the case, make drafts thereon through the medium of insurance.

We have a great deal of fire in the United States. It takes a great deal of fire to burn $100,000,000 of property values every year. How much of this fire is of criminal origin? This is a question which no one can answer with precision, for there are no data from which to figure out an exact percentage. The statistics which, in the main, I shall use as a basis for the conclusions reached in this paper, viz., *The Chronicle* Fire-Tables, show that during the years 1884, 1885 and 1886 there were 44,216 noteworthy fires in the United States. Causes were assigned for 21,055 of these fires, the causes of the remainder being either not reported or stated to be unknown. Of the 21,055 fires whose causes were given, 5,459 were attributed to incendiarism, that is, about twenty-six per cent of the whole number of fires of known origins. As I have intimated, this cannot be considered an exact percentage, but I think it may safely be accepted as a fair approximation to the truth. It may be that the admitted unreliability which attaches to all reports of fire causes, not officially determined, has had the effect of prejudicing the incendiary's case by counting against him suspicion as the equivalent of fact, but on the other hand it may be argued, and certainly the majority of fire underwriters believe, that many of the fires whose origins are called unknown are due to incendiarism in disguise. Assuming that the one possibility may offset the other, it seems wise to get our probabilities from what we are warranted in terming, comparatively speaking, the fires of known origin. Hence, we arrive at the probability that twenty-six per cent of the fires annually occurring in this country are wilfully caused, and consequently criminal in their nature. In my opinion this is a tolerably close measurement of the numerical proportion of incendiary fires. . . .

Once in a while somebody who has suddenly become impressed with a sense of the enormity of the loss by incendiarism, raises his voice to denounce the whole system of fire insurance, alleging that insurance companies are responsible for criminal fires, that there is but one motive for incendiarism worth speaking of, namely, the cupidity of over-insured persons. I think a very little study will disprove this theory utterly. Reckless practices by companies and agents, the one anxious to do a large rather than a safe business, and the other filled with a mania for commissions, may render the conditions easy for dishonest policy-holders to fire their premises, but possibly the influence thus exerted has been much over-estimated. Let us turn our attention for a moment to finding out, if we can, some of the motives for incendiarism. Several weeks ago I read in the *American Exchange and Review*, of Philadelphia, that the accomplished editor of that journal, Dr. J. A. Fowler, knew twenty or more different kinds of incendiarism. I asked him what they were, and will now read you his classification:

1. The incendiary policy (moral hazard).
2. The incendiary for gain or advantage other than insurance.
3. The revengeful incendiary (fires of feuds).
4. The discharged employé.
5. The malicious servant.
6. The rioter.
7. The tramp.
8. The thief (for concealment of theft).
9. The thief (for opportunity for theft).
10. The murderer (for concealment of crime).
11. The incendiary for murder.
12. The mischievous small boy (or girl).
13. The contriver for incendiary reward.
14. The fire-bug, or fire-conspirator (terrorizing by fire).
15. Incendiarism from momentary rage.
16. The drunken incendiary.
17. Incendiary firemen.
18. The don't-care bonfire kindler.
19. The don't-care pyrotechnic exploder.
20. The don't-care manufacturer of unsafe kerosene, etc.
21. The "pyromaniac."

The "pyromaniac," as Dr. Fowler remarks, cannot be considered a legal incendiary; neither can 18, 19 and 20 on his list, "but they bring the trespass so near the crime that they can be admitted into the insurance catalogue of incendiaries as being practically such." Possibly this long list might even be extended, but it is sufficient as it stands to show that all the incendiarism is not attributable to over-insurance. Indeed, one cannot read the newspapers intelligently

without discovering an abundance of incendiarism not due to insurance. . . .

If more evidence is needed on the point that property destroyed by incendiary fires is not in the aggregate heavily insured, a few statistical facts may be mentioned. The fires of last year described as incendiary were in number 1,959. By these fires a money loss amounting to $7,769,690 was incurred on the property in which the fires originated. The loss to insurance companies on the same property was $3,933,882, leaving a net loss of $3,835,805 which fell upon the owners of the property. In other words, the owners were indemnified through insurance only to the extent of fifty-one per cent of their actual loss. In the face of this showing it is the idlest of talk to attribute incendiary fires solely, or principally, to a motive to realize on insurance policies. What motive can insurance give a set of men to burn one dollar's worth of property in order to be repaid fifty-one cents? Another fact should be noted. The average insurance on the entire amount of property burned in 1886 was fifty-eight per cent, consequently we have before us the fact — very difficult to reconcile with the assertions frequently and recklessly made that insurance furnishes the motive for incendiarism — that the property said to have been destroyed in the United States in 1886 by incendiary fires was actually insured to a smaller extent than property in general destroyed by fires from all causes during the same period. There is still another point that should not be passed by. Although the mean amount of incendiarism in fires as a whole is twenty-six per cent, as stated, the amount of incendiarism varies in different classes of risks. For instance, fires in tobacco-barns are about eighty-five per cent incendiary; in country stores, about sixty-seven per cent; in jails, about sixty-six per cent; in rinks, about sixty-six per cent; in livery stables, about sixty-three per cent; in slaughter-houses, about fifty-nine per cent. Now, it ought to follow if the theory that insurance furnishes the motive for incendiarism is to be borne out, that these classes of risks are heavily insured. But they are not. Many insurance companies will not write policies on these properties. It does not at all seem to be the case — as it ought to be if insurance furnishes the motive — that the percentage of uninsured loss runs down as the ratio of incendiarism runs up. On the contrary, nearly all the classes of property distinguished for intense incendiarism show large property losses in excess of the amounts of insurance paid, and this fact appears to prove conclusively that property having a high moral hazard is pretty generally known and avoided by fire-insurance companies.

In any fair study of the causes of criminal fires, no other conclusion can be reached than that private enmities, business rivalries, mischief, malice, race-prejudices and hatreds, factional quarrels, jealousy, religious intoleration, fire-raising for purpose of theft or to hide theft, fire-raising for purpose of murder or to hide murder, labor troubles, and so on, correctly account for the majority of incendiary fires.

The distribution of incendiarism by months and seasons is not without interest. The crime of suicide is known to be comparatively frequent in certain months and infrequent in others. The same peculiarity marks the distribution of other crimes. The monthly curves of incendiary fires during the four years ending with 1886 show that whatever the number of criminal fires in January, there are likely to be fewer in February; March is likely to have more than February, April more than March, and May more than April. In June the incendiary takes a rest. In July he is a little busier than in June, with a tendency to be very active in August and September. He is generally more riotous in October than in September, while in November he manifests an equal inclination to increase or diminish his business. In every year of the four there have been fewer criminal fires in December than in November. A chart of the average monthly number of incendiary fires in the United States for the same four years shows that criminal fires are much more numerous in the months of August, September, October, November and December, than in the seven remaining months of the year. The greatest number of these fires is attributed to November, but this result appears to have been mainly due to an intensity of incendiarism in November, 1886, which may have been an outgrowth of the widespread labor troubles prevailing last autumn, or possibly to other causes. This monthly distribution of criminal fires is decidedly queer. For four years the number in January, May, June and July has been singularly uniform. The months in which the fluctuations of the incendiary wave are most pronounced are September, October and November. Indeed there seems to be an extraordinary regularity in the number of criminal fires in the first six months of the year; we find the chief irregularities and widest fluctuations in the last half of the year. And we find another thing, viz., that in this period criminal fires, taking the whole country, are excessive compared with the earlier months.

The geographical distribution of criminal fires is, of course, a matter of importance. The ratio of incendiarism seems to range steadily higher in the Southern States than in any other part of the country. In the annual summing up of fire causes for the past three years no less than sixteen States have reported over one-half of the fires within their borders, whose causes have been given, as incendiary. Twice in three years Arkansas, Kentucky, West Virginia, Nevada and Connecticut have reported this proportion of criminal fires. The short period covered by the statistics, however, does not permit the acceptance of these results as exact, but as far as they go they are interesting and probably foreshadow the truth. It is plain that we must find the explanation for incendiary tendencies in the character and occupation of the people and the nature of their surroundings. Ignorance and illiteracy do not satisfactorily account for the prevalence of the crime in one section more than in another. Incendiarism is by no means a crime peculiar to the uneducated. But it does appear that a large percentage of persons sent to prison for arson are entered on the prison registers as having no trade or settled means of livelihood.

We have learned from the monthly distribution that during the months when there is the greatest activity in the agricultural districts criminal fires are comparatively frequent, that they are especially numerous in the time of year devoted to harvest. Moreover, during the months when most of the great crops are growing, there is a lull in the reports of incendiarism. It may seem anomalous to those who have schooled themselves to think that incendiary fires proceed from an owner's or occupant's purpose to make money by firing his own premises — in other words, from inherent moral hazard — that incendiarism should be rampant in the season of harvest and plenty, when granaries are bursting with the products of the soil, and the farmer is on the eve of realizing a money return for his year's work. There is, however, nothing strange in this peculiarity if we profit by the teaching of observation, namely, that the greater part of incendiarism is due to other causes than the burned-out persons' desire for self-gain. The bulk of incendiarism originates outside of owners or occupants; it comes, so to express it, from moral exposure — from revenge, malice, jealousy, mischief and similar motives. It is, therefore, not to be considered remarkable that farm property should be burned at a time when the loss will be most keenly felt by the sufferer. We are not compelled to eliminate altogether the motive of self-gain to account for the excess of criminal fires about the harvest period. A declining market, an upward turn of the rates of transportation, an inferior quality or scant quantity of the crop, not to mention other possible discouragements, may operate as a motive for incendiarism if there happens to be an abundance of insurance around. I shall venture the conclusion that the record of incendiary fires by months, the preponderance of agricultural risks in the annual list of criminal fires, the experience in other countries, notably in Prussia, where incendiarism in the agricultural regions is from three times to four times as frequent as in the cities and towns, all tend to demonstrate that the proportion of incendiarism in different States and sections is determined, other things being equal, by the relative extent of their agricultural areas. The nature of the chief product, whether cereals, cotton or tobacco, the tenure of the land, whether by ownership or by renting, and the density of the agricultural population, are secondary influences. It is worthy of record that the wave of incendiarism reaches its highest altitude in the tobacco and cotton States.

For the purpose of finding out what the public is doing in the matter of convicting and punishing incendiaries, I addressed a circular letter a few weeks ago to the wardens of the State prisons and penitentiaries in the various States, asking information respecting the number of prisoners on hand at the last report, and the number on hand at the same date serving sentences for incendiarism. Responses were received from thirty-eight institutions, representing thirty States and territories. The whole number of prisoners reported was 31,176. How many of these convicts do you suppose were sentenced for arson or incendiarism or attempts? Only 486, or about 1.56 per cent. Apparently, it is good work if the people, by their own efforts, manage to put as many as 100 incendiaries behind the bars in the course of a year.

The present prison population of the United States is approximately 60,000. If 1.56 thereof are incendiaries, then there are to-day 936 persons in the United States undergoing punishment for the crime of arson. But nearly one-half of the whole number of prisoners are confined in county jails, houses of correction and reformatories, and among this class there is a low percentage of incendiaries. Consequently, if we place the number of "fire-bugs" now confined in penal institutions at 600 or 700, probably the estimate will be liberal. Now let us recall that during the three years ending with 1886 there were 5,459 criminal fires — which undoubtedly means close upon 5,459 incendiaries — among the fires whose causes we know something about, and we can get a fair notion of what the public is doing, rather should we say what it is not doing, in the way of punishing incendiaries. How many criminal fires were hid away in the great aggregation of unknown and not reported causes can only be conjectured. We can afford, for the moment, to concede that among the fires of unknown and not reported origins there was not a single incendiary fire, and still charge upon the people a failure to convict one incendiary in twenty.

What are fire underwriters to do? The only way they can meet this intense moral hazard is by stretching the premiums. They do so and then the gentlemen from the red-hot rural parts go down to next winter's session of the legislature and vote for a valued policy law, vote into force a statute which has the effect of increasing whatever part of incendiarism is really due to a motive to get insurance money. Underwriters may do another thing. They may try, and they have tried, to spur up the people by showing how incendiarism can be detected and convicted. The National Board went into the business of offering rewards years ago, but it failed to accomplish any great amount of good either in the direction of stimulating people to do better work in punishing incendiaries or in reducing the percentage of criminal fires by "making examples." The latest

statistics for arson and incendiarism in the different States, is compared with the National Board's "tabulated statements showing the number of imprisonments and terms of sentences for arson and incendiarism in each State during the years 1865 to 1876, both inclusive," do not reveal any noticeable improvement, numerical or otherwise, in the punishment of incendiaries. It does appear, however, that as the fire underwriters took it upon themselves to detect and prosecute criminals of this class, the public vigilance relaxed. Of the arson convicts imprisoned in the New Jersey State prison at the last report, no less than forty per cent were National Board men; those convicted by the National Board's efforts in the State of New York amount to twenty per cent of the arson convicts in Sing Sing and Auburn; in Connecticut twenty per cent are National Board men; in Maine one of the four; in Rhode Island one of the two; in Vermont four of the seven are National Board men. In the State prison of New Hampshire — a State which has deliberately thrown all the obstacles it can in the paths of fire insurance companies — there are two prisoners sentenced for arson, both of them National Board men. Fire underwriters have done all they reasonably can be expected to do to suppress incendiarism. They have informed the people of the extent of the crime, and have stepped outside of their legitimate business to become prosecutors. But the public has neither been apt to learn nor thankful for service, and has shown a disposition to augment the burden rather than assist in lightening it. And that is practically its attitude to-day.

A sneak thief may steal overcoats or silver plate, he may sometimes take away a few hundred dollars of value, but the prowling incendiary, every time he applies his torch, robs society of nearly $6,000. Such was last year's average.

We have seen that the property losses by criminal fires reach an enormous figure, that the aggregate is of a magnitude equal to the total losses by the fires of one-fourth of the year, that inferior police regulations and other causes place the agricultural districts in the front place as regards intensity of incendiarism, and that the passions and weaknesses of human nature which have existed since the world began, and not the insurance policy, are responsible for the majority of criminal fires. Whether it is worth while for the people to make an earnest effort to repress incendiarism is for them to decide. They can go on paying-in their insurance premiums, the price of their revenge and jealousy and bigotry and hatred and lawlessness, they can remain blind to the acts of the incendiary and punish him with leniency or not at all, but they must foot the bill. Exactly how the people should proceed to repress incendiarism I shall not undertake to say, further than to remark there seem to be two essentials in the way of a beginning: (1) fire coroners in every county, whose duty it shall be to inquire into the causes of fires; (2) a decent enforcement of present laws relating to the crime of arson. I think the opinion is universal that the failures of justice which we see around us every day are due not so much to a lack of proper laws as to the non-enforcement of them. At its last meeting the National Prison Association of the United States saw fit to adopt a resolution reading as follows: "Promptness and certainty in the detection and punishment of crimes are the chief agencies by which society can protect itself against the criminal class; the deterrent forces of the law now lose a great part of their value through the needless delays, uncertainties and irregularities of our criminal jurisprudence: we earnestly recommend such changes in the laws and in their administration that judgment against crime shall be executed with certainty and speed." When the crime of arson shall be punished with promptness and certainty there will be much less of it, and the people can save money in two ways — by preserving millions of dollars' worth of property now destroyed every year by criminal acts, and by obtaining from fire insurance companies the lower rates of premium they are constantly praying for. Until moral hazard, in any branch of underwriting, is circumscribed by the rate of premium, insurance business is impossible. When the people compel fire insurance companies to meet an almost unrestrained incendiarism, when they compel them, as it were, to build a premium wall around sheol, they must understand and expect that the cost will fall upon them. If the fire-waste of the year should assume the characteristics of the tornado, and sweep across the nation from coast to coast, confining its destructiveness to one narrow path, there would be no failure on the part of the public or the press to realize the immensity of the devastation. Nor would there be a failure to realize the extent of the waste by incendiarism, nor a failure to perceive the necessity to adopt the most vigorous measures to repress this crime, if it should appear — as by the present statistics it would appear — that the part of this desolate track lying between the city of Chicago and the Atlantic ocean represented the proportion of the whole fire loss due to criminal fires.

SOCIETIES

FIRST ANNUAL COMPETITION OF THE ARCHITECTURAL LEAGUE.

THE Architectural League takes pleasure in announcing that it has instituted, in connection with its Exhibition, an Annual Competition, open to all draughtsmen in the United States under the age of twenty-five. The object of such competition to be the promotion of good design and the improvement of draughtsmanship.

As prizes, it offers to the design placed first, a gold medal, to be known as The Gold Medal of the Architectural League; and to the design placed second, The Silver Medal of the Architectural League.

The conditions for admission to the competition are:

1. That the competitors shall be residents of the United States, and under the age of twenty-five; and —

2. That the drawings shall be made in conformity with the following programme, and, in all parts and portions, entirely by the hand of the competitor.

The drawings will be judged by the jury appointed for that purpose. The successful drawings, and such others as may be thought worthy, will be hung at the Exhibition, the first and second prize-drawings being so indicated, and these latter shall thereupon become the property of the League.

For the First Annual Competition the following programme has been arranged:

The drawings shall exhibit a "Memorial Clock and Bell-Tower on a Village Green." The tower to stand on a base which shall not exceed the dimensions of a square of twenty-two feet.

Each contributor to exhibit two sheets of drawings: one to contain plans and elevations at the scale of four feet to the inch, and one to exhibit a perspective view. The plan-and-elevation sheet to be finished in line with India ink and the lining-pen. No brush-work on this sheet, except in blacking-in windows and sections. No shadows are to be cast. The perspective sheet to be rendered at will. Each sheet to be cut to the uniform size of 24 by 32 inches, and to be white card or Bristol board, or Whatman paper, mounted on stretcher. No colored borders, frames, or glazing will be allowed. Each sheet must be distinguished by a motto or cypher. A sealed envelope, bearing the same motto or cypher, must contain the name and full address of the author.

Drawings are to be delivered flat, carriage paid, on or before December 5, 1887, to Chas. I. Berg, Secretary, 152 Fifth Avenue, New York City. They will be returned at the close of the Exhibition at the expense of the contributor.

JOHN L. DU FAIS, *President.* CHAS. I. BERG, *Secretary.*

WM. C. HAZLETT, JOHN L. DU FAIS, CHAS. I. BERG, } *Committee.*

ILLINOIS ASSOCIATION OF ARCHITECTS.

THE annual meeting of the Illinois State Association of Architects was held at its rooms last week Saturday, October 1. The election of officers for the ensuing year resulted as follows:

President, Samuel A. Treat; First Vice-President, L. D. Cleaveland; Second Vice-President, C. L. Stiles; Treasurer, H. W. Hill; Secretary, R. C. Berlin; Executive Committee, L. H. Sullivan, W. W. Clay, John W. Root and Alfred Smith.

The Treasurer announced the following figures:

Cash on hand October 1, 1886	$1,099.52
Receipts during year	1,096.75
	2,196.27
Disbursements	1,481.10
Balance on hand September 30, 1887	715.17

Mr. John W. Root, for the Executive Committee, announced that as a result of the concert of action with the Chicago Chapter of the A. I. A., the sessions of the annual meeting of the American Institute of Architects would be held in the New Art Institute Building, and that the Leland Hotel had been made the headquarters of the members who should attend the meeting.

COMMUNICATIONS

A CORRECTION.

CLEVELAND, O.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Please note item of building intelligence in issue of September 3. The Hollenden Hotel on Superior Street — we are not the architects — but Geo. Hammond, of this city.

Very truly yours, COBURN & BARNUM.

NO REDRESS FOR STEALING EXECUTED DESIGNS.

NEW YORK, September 26, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you please inform me what redress, if any, one may have when an exterior detail — say, an elaborate entrance to a private building — is deliberately measured off and literally reproduced by a firm of builders, without sanction from either owner or architect? Yours truly, WILLIAM B. TUTHILL.

[UNLESS the design was copyrighted, we do not think there is any redress, as the law now stand in this country. — EDS. AMERICAN ARCHITECT.]

ANOTHER UNRULY CLIENT.

September 28, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — A man called wanting a $5,000 house, exacting more than that amount of money would procure. I remonstrated at every new requirement, assuring him it would overrun his figure. He was very irritable when I spoke thus, and told me he was an old builder and knew what he could do. After many changes and additions all

made under protest by me, his drawings were finished. Soon after he called, having learned from some builder who had seen plans in the office that they would cost over $5,000. He said he was satisfied with them if they could be built for $5,000. I told him they would cost $7,000, and asked him to take and pay for them. He declined. I placed the matter in a lawyer's hands, directing him to compromise if possible. The lawyer sent for him. He called and said he would take plans and look them over and return them next day, and probably make an offer of settlement. He has not done so, but I learn he has been taking bids for two months, and expects to build. Please give your opinion of the case. Respectfully,

PRACTITIONER.

[This client seems to be rather slow pay, but our advice would be not to hurry him too much. There is no indication that he does not intend to be honest, and the architect may console himself for waiting by the reflection that the acceptance of the plans implied in building from them will remove the last pretext for refusing to pay for them in full. — Eds. American Architect.]

NOTES AND CLIPPINGS

Steam-Pipe for Heating Purposes. — The *Master Steam-Fitter* gives the following rule for finding the superficial feet of steam-pipe required to heat any building with steam: One superficial foot of steam-pipe to six superficial feet of glass in the windows, or one superficial foot of steam-pipe for every hundred square feet of wall, roof, or ceiling, or one square foot of steam-pipe to eighty cubic feet of space. One cubic foot of boiler is required for every fifteen hundred cubic feet of space to be warmed. One horse-power boiler is sufficient for 40,000 cubic feet of space. Five cubic feet of steam, at seventy-five pounds pressure to the square inch, weighs one pound avoirdupois.

Steel Tubes made from Solid Rods. — A curious way of making steel tubes from solid rods was communicated by Dr. Siemens to a recent meeting of the Akademie der Wissenschaft. A steel tube ten centimetres long (nearly four inches), with perfectly smooth external and internal surfaces, and extremely uniform bore, and whose walls are apparently of perfectly equal thickness at all points, was prepared in this manner: Two rollers, slightly conical in shape towards their lower ends are made to rotate in the same direction near each other; a red-hot cylinder of steel is then brought between these cylinders, and is at once seized by the rotating cones and is driven upwards. But the mass of steel does not emerge at the top as a solid, but in the form of the hollow steel tube which Dr. Siemens laid before the meeting. This striking and singular result was explained by Professor Nessen. It appears that, owing to the properties of the glowing steel, the rotating rollers seize only upon the outer layer of the steel cylinder and force this upward, while at the same time the central parts of the cylinder remain behind. The result is thus exactly the same as is observed in the process of making glass tubes out of glass rods. — *New York Evening Post.*

Robert Morris's "Folly." — A gang of workmen were digging a cellar in the rear of 723 Sansom Street recently and destroying the lower walls of what was once the most notorious policy-shop and gambling-hell in this city. They came upon the massive foundations of the colonial mansion partly reared by the great financier of the Revolution, and known as Robert Morris's Folly. In 1798 the plot of land bounded at present by Chestnut and Sansom Streets on the north and south, and by Eighth and Seventh Streets on the west and east, was offered for sale, and Robert Morris became its purchaser at the cost of $50,000. To do this Mr. Morris disposed of other real estate on Market Street, which brought him $20,000. His ideas regarding the manner of house he desired were princely, and for those days somewhat extravagant. A French architect drew the plans and contracted to rear the building he had drawn on paper at a cost of $60,000. The extensive scale on which the mansion was laid out is shown by the fact that the cellars were divided into two stories, and that underground there was still room for a small army of servants before the first floor was laid. As the house grew, the architect's demands grew in proportion, and the estimated $60,000 became $80,000 before the third story was completed. Morris found himself unable to carry on the operations, and the house was sold at sheriff's sale. This was Robert Morris's Folly Recently the foundations of the notorious 723 Sansom Street, where murder, faro and policy have all had their victims, were found to rest on the broad six-foot foundations laid by Robert Morris's extravagance. — *Philadelphia Press.*

More about the Lighting of the Vienna Opera. — After a fortnight's experience the electric lighting of the Vienna Opera, at first criticised as defective, owing to some local jealousies, is now admitted to be a complete success, and Baron Beczny, director of the Imperial Court theatres, recently received the Grand Cross of the Francis Joseph Order in token of the Emperor's approbation. The success which has been attained here has a somewhat important bearing on the lighting of large public buildings in towns, as Mr. Monnier has solved the problem of supplying a perfectly steady and regular light to a theatre of such huge dimensions as the Grand Opera, one of the scenic requirements of which is, that lights equal to those ordinarily burning in sixty or eighty private houses may be suddenly put out or turned on without affecting the remaining lamps even in the smallest degree. Further, the generating machinery, which usually would require to be of 600 horse-power, and which it would, therefore, be impossible to place in, or even near, the building to be lighted, has in this case been established a mile away — a feat which nobody had previously attempted, or even considered possible. The difficulties indicated have made the construction of the machinery an exceptionally difficult work. The chief points which strike the spectator are the fixity and brilliancy of the lights in the auditorium, *foyer* and *loggia*, and the beauty and steadiness of the scenic effects. The changes in the intensity and steadiness of the lights can be made so slowly that lately, in the garden scene of "Faust," the gradual darkening of the stage extended over a period of twenty minutes, so as to be imperceptible to the audience — which is a great contrast to the jerky effects obtainable with gas, or even previously with electricity. — *London Times Vienna Correspondence.*

TRADE SURVEYS

Every indication on the surface of trade points to a continuance of the industrial and commercial activity which has made the present year a phenomenonal one in our history and as against one year ago, there is practically an increase of one hundred million dollars for business purposes. Should the law-makers perfect a fiscal system which would make the Government a less exacting tax-gatherer, it would remove one cause of apprehension from the mind of the public and help to strengthen confidence. There is no doubt but that practical statesmanship will be able to deal with this difficulty, which is exaggerated. The accumulation of large volumes of idle money is not only unnecessary, but, in many respects, harmful; yet it has its advantages in enabling the Government to throw its powerful arm around the business interests in the event of a general stringency. The only remedy in the estimation of the practical business man is a sufficient supply of money, but the question arises — what is that? Financiers know that it is possible at times, regardless of the abundance of money, to corner it, and they know that while the Government has in its possession a large amount of money with outstanding bonds, that no manipulation is possible, such as years ago overtook the commercial interests. The remembrance of those disasters will lead to at least an effort to establish a better and more elastic fiscal system. Revenue reform will be an important issue until it is settled upon a permanent basis, but as yet, politicians in both great parties are far from being a unit as to the best policy to adopt. The business interests have more to say in legislation now than they have had for years past. It is safe to say that their interests will be respected, and that whatever legislation is passed it will be based upon the practical business requirements of the country. The manufacturers everywhere are very busy. Prices are strong and are pointing upward rather than downward, but our best authorities East and West are free to say that another general advance in the prices of staple products will be made. It is the desire of the business interests of the country to avoid speculative business advance in any direction, and the policy they are pursuing and have been pursuing for a year make speculative views impossible. There is an absence of material of all kinds. There is a heavy demand for all kinds of manufactured products. Raw material, abundant as it is, is promptly absorbed for current requirements. The cotton crop is large, but is practically sold already. The wool clip will necesitate large importations. The petroleum supply is keeping pace with the market demands. Export trade in all leading products is heavy and is helping to keep the market price of all domestic products high. The petty industries are very promising. Thousands of little manufacturing establishments have sprung up during the past six months employing capital ranging from five thousand to fifty thousand dollars. These little industries have been planted in good spots and have every indication of permanency. The growth of corporations and of corporative power is an alarming subject to a good many, but if we measure this growth with the growth of little interests on a solid basis backed by sufficient capital and knowledge, we have less fear to entertain as to the possible effects of extending monopoly. The monopolies which exist are necessary in their time and place, without moralizing upon the question, we can say with safety that the monopolies against which so much complaint is being made are the legitimate products of conditions and surroundings. They will go as they come when their time comes. They are serving a good purpose, and will lay the foundation for a greater prosperity than that in which they found such good root. There are already indications of a departure from early wealth-producing methods. There are opportunities for men of small capital which did not exist a few years ago. The industries are being decentralized in such far-off States as Missouri, Iowa, Minnesota, and even in the Territories mining, manufacturing, and agricultural interests are gaining strength.

The condition of the great industries is about the same as two or three weeks ago. Rails, however, have declined one dollar per ton. Bar iron and merchant steel are fair in price. All kinds of crude iron hold their own. Ship and bridge building is being pushed very actively. Large orders have been placed during the past week at locomotive and car works. Several railroad companies are short of locomotive capacity, and all of the trunk lines are reported short of cars. There is great activity in the anthracite coal regions. The production this year is about 2,500,000 tons ahead of last year. A strike has been organized in the Lehigh region, but the deficit in consequence will not exceed perhaps 25,000 tons per week. The increased supply of bituminous which is available will probably compensate to a large extent for this deficiency. The builders all along the Atlantic Coast and along the Western slope of the Allegheny Mountains are crowded with orders, and complain of a scarcity of cars. Late advices from leading Western builders indicate that the coming winter will be one of greater activity in building than last year. Much work that was projected, but not undertaken, will be begun this winter. A large amount of capital is seeking employment in the far Northwest. The revival of interest in the Northern Pacific has opened a multitude of opportunities for capital which did not exist before. There is quite an opening for labor on the new lands recently thrown open by the Government. There is also great activity among the gold, silver, and lead miners of the West. The demand for machinery for improved mining methods has never been so great as at present. The mining-machinery manufactories in Chicago are oversold. Chain works, wire works, wire-fence factories, and a long list of manufactories (implement) East and West are in a better sold-up condition than October 1st last. Textile manufacturers of New England, as well as the boot-and-shoe makers are pretty well oversold. The makers of paper are in possession of a larger amount of business to be executed during the next three months that it has been their fortune to have at any one time heretofore. All of the industries throughout the New England States are doing very well.

The labor question is giving but little trouble, and there is a disposition among the workingmen to avoid radical measures, such as were so apparent a year or two ago. The various parties are familiarizing themselves with their work, and are endeavoring to create a friendly feeling wherever they are called upon to act. While labor is still organized it is not as much disposed to crowd employers as when struggling for organized institution. The Knights of Labor and the National Federation will probably agree to act in harmony, and one will be, to a large extent, an offset to the other.